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Notes and Comments

Concerning Synthetic Rubber

THE impending commercial production of rubber by E. I. du Pont de Nemours and Co., at their New Jersey plant (see THE CHEMICAL AGE, November 28, 1931, page 473) recalls the partially successful efforts of Germany's chemists to make synthetic rubber during the war. Cut off by the blockade from the plantations, Germany perfected a very similar process to that recently devised in Wilmington, Del., by the du Pont chemists, but cost was no barrier to the Germans when crude natural rubber was unobtainable, whereas the new American synthetic product, claimed to be in some respects superior, will have to compete with nature's efforts at six cents a pound. It was in 1928 that Dr. A. von Weinberg of the German dye trust predicted that synthetic rubber "would soon appear on the world markets as a commercial commodity, equal to natural rubber and cheaper in cost," but the world is still waiting for the fulfilment of this prediction. Numerous patents have been taken out in the last twenty years for the synthesis of rubber. All these patents cover two separate stages, the formation of a liquid hydrocarbon like "isoprene," obtained when rubber is distilled in the absence of air, and processes for coaxing the isoprene or similar molecules to condense with one another to form a rubber-like network. The second process, known to the chemist as polymerization, was first carried out by a French chemist, Bouchardat, as long ago as 1882 and has been repeated in many other ways since then. In both the German war process and the du Pont process the first stage begins with production of the gas, acetylene, from calcium carbide by adding water. The acetylene is then combined with hydrogen and condensed to form a liquid called vinyl-acetylene closely related to iso-

prene and that in turn is condensed to form chloroprene and then synthetic rubber. The new du Pont product is claimed to be superior to natural rubber in that it vulcanises or hardens without the addition of sulphur, does not swell noticeably in gasoline and can be made to form a liquid similar to the tree latex but superior in its ability to penetrate porous materials. A similar X-ray structure to natural rubber is found in the new rubber. Isoprene is most easily made from turpentine, which it resembles chemically, but with turpentine costing about five cents a pound this is not practicable. It can also be obtained as one of the products of the Bergius process for liquefying coal.

The stages by which this new synthetic rubber was discovered and perfected, were revealed by Dr. W. H. Carothers to the fourth Organic Chemistry Symposium of the American Chemical Society at New Haven. Synthetic rubbers are derived mostly from a group of simpler substances, liquid hydrocarbon oils known as "dienes," Dr. Carothers explained. On being allowed to stand, these compounds react slowly with themselves to form substances resembling rubber. In the case of isoprene, commonest of the dienes, which is obtained by decomposing natural rubber itself, this conversion to a rubber-like product is very slow and difficult to control, hence the limited success reached in trying to commercialise this process. Other dienes were prepared and studied by a group of du Pont chemists including Dr. Arnold M. Collins, Ira Williams, Dr. Gerard J. Berchet and Dr. James E. Kirby, besides Dr. Carothers. Special attention was paid to the reactions of the dienes prepared from vinylacetylene, a compound formed by the joining of two molecules of the common gas, acetylene. Success crowned these efforts in the discovery of two dienes, chloroprene and bromoprene,

having the desired behaviour. These compounds are very similar to isoprene; in them chlorine or bromine replaces the methyl group of the isoprene molecule. They react with themselves very rapidly to form rubber-like products and thus permit the systemic study and control of the effect of different conditions on the transformation. The work of Professor J. A. Nieuwland of the University of Notre Dame and of W. S. Calcott, F. B. Downing, and Dr. A. S. Carter of the du Pont Company on the polymers of acetylene, also contributed to make this achievement possible.

Railways and Scientific Research

So wide are the ramifications of chemical research that few, if any, of our great industries are beyond the reach of its advantages, and it is of interest to note that the railways are increasingly recognising the possibilities of its application to their hard hit undertakings. Speaking at the annual meeting of the London Midland and Scottish Railway Company last Saturday, Sir Josiah Stamp referred to the beneficial work of the Company's Scientific Research Committee set up about two years ago. These eminent men of science, he said, each a specialist in his own field, have now become consolidated into a team which, working with the technical officers, is a great stimulus to them, and is selecting the best methods by which some of our more fundamental problems may be attacked. Some of the investigations have already reached a stage which justify practical adoption, and, in such cases as these, financial savings are beginning to accrue. This committee has naturally dealt first with problems of major importance in respect of expenditure, such as the life of paint and the wear of tyres, which determine the intervals between the shopping of vehicles, the life of firebox stays, and the design of rolling stock in relation to wind resistance. The research section is at the service of all departments; the results of research carried out by scientific institutions in various parts of the world are also being regularly brought to their notice through the issue of a monthly review of technical literature, which is produced under the guidance of the committee. Sir Josiah Stamp mentioned last year the appointment of a small joint committee to investigate certain problems connected with locomotive fuel and water. He now announced that as the result of the completion of one phase of the work of this committee on the different methods of treating water now available, it has been decided to install 28 water softeners, between London and Carlisle. A substantial saving in the cost of boiler maintenance will be secured as the result of the use of softened water.

Overseas Trade Services

THE Department of Overseas Trade has issued a revised edition of its guide to the services which it offers to United Kingdom firms interested in the development of export trade. The need for expansion of United Kingdom trade overseas is urgent and this booklet, descriptive of the various activities of the Department, will be of particular interest. A foreword is contributed by Major John Colville, the Minister in charge of the Department, who appeals to every trader, large or small, to extract the fullest possible benefit from the services placed at his disposal, and affirms his intention to continue the work of the Over-

seas Trade Development Council to which he attaches great importance as a means of tackling specific problems and assisting the expansion of the export trade generally. The booklet is divided into sections relating to standing information, commercial news, economic surveys, the British Industries Fair and the overseas organisation of the Department.

United Kingdom manufacturers and exporters alike will welcome the publication of a booklet giving particulars of the many ways in which the Department of Overseas Trade can help them. It is a booklet intended for all British traders and is a direct invitation to avail themselves of facilities which can be had for the mere asking. The extent to which the Department of Overseas Trade can be of assistance is not generally realised nor is it appreciated that little or no cost is involved, and that, in adhering to its policy of "assistance without interference," this Department, which controls a network of representatives all over the world, places at the disposal of traders a centralised organisation constantly on the alert for every opportunity to benefit British trade. Export trade is a vital need. How to expand it is an urgent problem. Competition to-day, moreover, is keen and the man who wishes to outstrip his competitors must study his market and his customers. If our export trade is to improve, co-operation between Government and trading community is vitally necessary, and the issue of this "Guide to the Services of the Department of Overseas Trade" is appropriate to the needs of the time.

The Calendar

- Mar. 5.—British Association of Chemists (London Section) Dinner. 6.30 p.m. Broad Street Station Restaurant, London.
- Mar. 7.—Society of Chemical Industry (London Section). "The Use of Ultra-Violet Light in the Works Laboratory." W. H. Nuttall. 8 p.m. Burlington House, London.
- Mar. 7.—Society of Chemical Industry. Joint meeting of London Section and Food Group. "Science and Food." Dr. L. H. Lampitt. 8 p.m. Burlington House, London.
- Mar. 8.—Institute of Metals (Swansea Section). Annual general meeting. "Metallography in Industry." Roosevelt Griffiths. 6.15 p.m. Y.M.C.A., Swansea.
- Mar. 9.—Institute of Metals. Twenty-fourth annual general meeting. 10 a.m. in the Hall of the Institution of Mechanical Engineers, Storey's Gate, London. Annual dinner and dance. 7 p.m., at the Trocadero Restaurant, London.
- Mar. 10.—Chemical Society. Third Pedler Lecture by Professor L. Ruzicka. 5.30 p.m. Institution of Mechanical Engineers, Storey's Gate, London.
- Mar. 10.—Society of Chemical Industry (Nottingham Section). "The Economics of High Temperature Carbonisation." Dr. E. W. Smith. 7.30 p.m. University College, Nottingham.
- Mar. 10.—Optical Society. Ordinary meeting. 7.30 p.m. Imperial College of Science, South Kensington, London.
- Mar. 10.—Oil and Colour Chemists' Association. "Synthetic Resin Finishes." H. Houlston Morgan. 7.30 p.m. 30 Russell Square, London.
- Mar. 10.—Institute of Chemistry (Manchester Section). Annual General Meeting. "The Mechanism of Chemical Change." Dr. T. M. Lowry. College of Technology, Manchester.
- Mar. 10.—Institute of Fuel (East Midlands Section). "The Economics of High Temperature Carbonisation." Dr. E. W. Smith. Joint Meeting with the Society of Chemical Industry. 7 p.m. University College, Nottingham.
- Mar. 10.—Chemical Society. Third Pedler Lecture. "The Life and Work of Otto Wallach." Professor L. Ruzicka. 5.30 p.m. Institution of Mechanical Engineers' Hall, Storey's Gate, London.
- Mar. 11.—Society of Chemical Industry (South Wales Section). "The Chemical Constitution of Coal." Stacey G. Ward. 7.30 p.m. Technical College, Cardiff.
- Mar. 12.—Finsbury Technical College Old Students' Association. Annual dinner. Trocadero, London.
- Mar. 14.—Sir John Cass Technical Institute. Public Lecture. "Asphalt Paving Materials." Donald M. Wilson. 8.30 p.m. Jewry Street, Aldgate, London.

Chemical Industry and the Import Duties Act

By J. Davidson Pratt

THE Import Duties Act which came into operation on Tuesday, March 1, requires to be studied by everyone connected with industry and trade in order that its full implications may be accurately understood. The fundamental principle of the Act is that it imposes a general *ad valorem* duty of 10 per cent. on all imports except those at present chargeable with a duty and those included in the Free List in the First Schedule. This duty is a revenue tariff, a point which is often overlooked. On this foundation there will be built up a super-structure of additional or protective duties, which will be imposed by the Treasury on the recommendation of an independent Import Duties Advisory Committee. Further, there will be free entry for all imports from the Dominions, India and Southern Rhodesia until November 15, 1932, or such later date as may be decided by the House of Commons; this will give sufficient time for the development and application of any proposals for inter-Empire preference that may be agreed by the Imperial Conference at Ottawa in July. In the case of all other parts of the Empire, including mandated and other territories under British protection, the Act allows free entry *sine die*. The Act also empowers the Government to vary the duties in order to make reciprocal arrangements with foreign countries which are willing to give preference to British goods. Supplementary duties may be levied up to a maximum of 100 per cent. *ad valorem* on the goods of foreign countries which show discrimination against British goods.

The Position of Chemicals

The first point in relation to chemicals arises on Clause 1, Sub-Clause (2) (a) which states that goods for the time being chargeable with a duty are exempt from the general *ad valorem* tariff of 10 per cent. The word "chargeable" should be carefully noted as this is the key to this Sub-Clause. Even if the duty which is chargeable is not actually charged, for example, where a rebate of the full rate of duty is allowed, the exemption holds good. The best example of this is the case of imported oil; "all petroleum oils, coal tar and oils produced from coal, shale, peat or bituminous substances and all liquid hydrocarbons" (Specification 1.) of non-British origin, when imported into this country, are technically liable to or chargeable with the current customs duty on hydrocarbon oils. Any product, however, which is outside the specification for hydrocarbon oils (set forth below), if delivered direct for consumption, is entitled to the full rebate of duty. The specification for hydrocarbon oils (Specification 2) is as follows:—

"Hydrocarbon oils, or mixtures containing hydrocarbon oils, of which oils or mixture not less than 50 per cent. by volume distils at a temperature not exceeding 185° C., or of which not less than 95 per cent. by volume distils at a temperature not exceeding 240° C., or which give off an inflammable vapour at a temperature of less than 22.8° C. when tested in the manner prescribed by the Acts relating to petroleum."

When a product within Specification 1, but outside Specification 2, is imported for refining, it is normally liable to the duty until it comes out of the refinery, either unchanged or as refined products. If unchanged, a rebate of the full duty will be allowed; if as refined products, then any within Specification 2 will pay the current hydrocarbon oil duty and any outside Specification 2 will be allowed the rebate. Consequently the 10 per cent. general *ad valorem* duty does not apply to imported oils under Specification 1 and the position under the hydrocarbon oil duty will remain unchanged. Thus bitumen produced in this country from imported oils will have no duty levied on it by the present Act, whereas imported bitumen will pay 100 per cent.

Stimulating British Industry

Fine chemicals, temporarily exempt from the Key Industry Duty of 33½ per cent. will pay the 10 per cent. under the Act, as they are not, for the time being, chargeable under any other duty, but when the Key Industry Duty temporary exemption lapses, the 10 per cent. general *ad valorem* duty will also lapse and the Key Industry Duty takes its place. This should stimulate British firms to undertake the manufacture of the temporarily exempted fine chemicals, especially in

cases where they are used in the manufacture of other products. Queries have also been raised as to the position of dyestuffs and intermediates imported by licence under Dyestuffs (Import Regulation) Act. These products, being non-chargeable with any other duty, will pay the 10 per cent. While this may appear to operate harshly on British colour users, since they will have to pay a 10 per cent. duty even when they obtain a licence, it will be to the advantage of British industry in the long run, and will stimulate the manufacture and consumption of British dyes.

The Free List contains many materials of interest to the chemical industry. Platinum in grain, ingot, bar or powder, is exempted, so that the basis of platinum catalysts and compounds is free of duty. Certain important raw materials of the soap and paint industries have secured exemption in the form of cotton seed, rape seed and linseed, and this should stimulate the production of the oils from these seeds in this country. Raw rubber, including crepe, rubber latex and raw gutta percha are also free, as are metallic ores, concentrates and residues, including scrap metals and wastes, fit only for the recovery of metal. This last metallic group includes a wide range of materials used to a certain extent by the chemical industry as its raw materials. The group includes the whole of Groups C and D of Class II of the Board of Trade Import and Export List, in which the most important items are:—Iron ore of all sorts, including bog-ore, used in gas purification, and old and scrap iron and steel; antimony ore, including crude antimony; bauxite and cryolite, the raw materials for the production of aluminium; bismuth ore; chromium ore, including chromite and chrome iron ore; copper ore, including regulus, matte, precipitates, cement copper and scale; gold ore; lead ore; manganese ore; molybdenum ore; monazite sand, from which various rare earths are separated, such as cerium and thorium used in the manufacture of incandescent gas mantles; nickel ore and matte; silver ore; tin ore and concentrates; titanium ore, a source of titanium pigments; tungsten ores; uranium, radium and radio-active ores; zinc ores of all kinds, including calamines, blenders, sulphides, and sulphide concentrates, the source of various products for the paint industry, such as zinc oxide, zinc sulphate and lithopone; and zirconium ore.

Important Concessions

The raw materials of the sulphuric acid industry are also free of duty in the form of iron pyrites, including cupreous pyrites and sulphur. This is an important concession, since sulphuric acid is perhaps the most basic of all chemicals and is used in practically every industrial activity; furthermore, the home raw materials represent only 25 per cent. of the output of sulphuric acid, while there are no practical supplies of pyrites and sulphur in the Empire. The farmer has received further consideration by the addition to the Free List, during the passage of the Bill, of potassium chloride and sulphate, kainite and other mineral potassium fertiliser salts, while the manufacturing industry will benefit by the additional inclusion in the Free List of potassium carbonate. Another important raw material of the fine chemical industry has been exempted in the form of cinchona bark for the production of quinine and its salts, of which the exports from this country are of the order of £200,000 per annum. The only other item in the list of interest to the chemical industry is radium compounds and ores.

Although the list includes many of the important raw materials of the chemical industry, there have been a number of serious omissions. Argol and other crude tartrates (the essential raw materials for the manufacture of tartaric acid), cream of tartar and other tartrates, which are not obtainable within the Empire and are never likely to be, have to pay duty. Imports are valued at about £500,000, and the material coming from Italy, France and Spain has to be bought on a gold basis. Furthermore, Italy and Spain have export duties on this material, so that British makers are already handicapped in competing with these countries in foreign markets. The extra 10 per cent. duty will strike a serious blow at our export trade in cream of tartar and tartrates which was valued at £300,000 in 1929 and just over £200,000 in 1930.

Essential oils are another notable omission from the Free List. A limited number of essential oils are made in this country, for which protection is desirable. There are also a number obtainable within the Empire, which in any case will come in free. The bulk of the essential oils have, however, to be obtained from foreign sources, and no Empire supplies are in sight. The total imports of such oils were valued in 1929 at over £1,000,000 and in 1930 at nearly £800,000. The most important of these are the citrus oils (oil of lemon, orange and bergamot). There is an important export trade in the products derived from these essential oils and in goods in which they are used, and the imposition of the duty will be a serious blow to this trade.

Other Omissions from the Free List

Mercury is another raw material of which there are no Empire supplies, and of which the imports in 1930 were some £340,000. Another good case for exemption is boron minerals, which are essential raw materials for borax and boric acid, and are not obtainable within the Empire. There are also a large number of natural products used in making medicinal preparations, of which there is no real Empire supply, including ipecacuanha, ergot of rye and a long list of roots, berries, leaves, etc. Gall-nuts, for the manufacture of gallic and pyrogallic acids, are obtainable only in China. Iodine can be obtained only in an insignificant amount in the Empire, while the Empire supplies of white arsenic, used as a basis for sheep dips, weed killers and insecticides, in which there is a large export trade, are quite inadequate. Citrate of lime is a borderline case. It is not obtainable in the Empire and at present most of the citric acid is made from it: there is, however, an alternative fermentation method from sugar which is already operating in this country and which can no doubt be extended if the 10 per cent. duty on citrate of lime is maintained.

Constitution of the New Committee

The constitution and procedure of the Import Duties Advisory Committee as set forth in Clause 2, calls for no special comment. This Committee is indeed fortunate in its personnel which comprises Sir George May, chairman; Sir Sydney Chapman and Sir C. Allan Powell. The appointment of Mr. Percy Ashley, as secretary, will receive unanimous approval, as there is no one who has a more intimate knowledge of British industry in all its ramifications. The Committee will get to work at once. It is not anticipated that it will call for individuals or organisations to appear before it at this stage, but rather that it will deal rapidly with the mass of information already in the possession of the Board of Trade, and make up its mind quickly as to the additional duties which should be imposed to give industry the protection which it needs.

Clause 3, which deals with the imposition of additional duties, is perhaps the one of most significance for the future of this country. In many industries, and for many of the products of the chemical industry, the general *ad valorem* duty of 10 per cent. will afford adequate protection from foreign competition, but for many other British manufactures much higher duties are required to stop foreign dumping. This clause empowers the Treasury to impose additional duties, without limit of any kind, on the recommendation of the Import Duties Advisory Committee, on goods of any sort which are chargeable with the general *ad valorem* duty—an important proviso—and which are either articles of luxury or articles of a kind which are being produced, or likely within a reasonable time to be produced, in the United Kingdom, in quantities which are substantial in regard to United Kingdom consumption.

Abnormal Imports

Sub-Clause (5) of Clause 3 refers to cases such as the Abnormal Import Duties, where the duties will automatically disappear with the Abnormal Importations (Customs Duties) Act, which is due to lapse on May 20, 1932, unless steps are meanwhile taken to extend it. The Import Duties Advisory Committee is empowered to make recommendations as to the duties to be imposed, if any, in place of the Abnormal Import Duties, and according to a statement made by the Chancellor of the Exchequer in the House, this will be one of the Committee's first tasks. The products in which the chemical industry is interested in this connection are citric acid, tar-

taric acid and cream of tartar; aluminium sulphate, ammonia alum; soda alum and potash alum; ammonium chloride; and lithopone.

Sub-Clause (7) of Clause 3 gives the Committee power to recommend at any time that the additional duties be varied or discontinued. This will be an important safeguard to prevent the exploitation of the tariff, either by industry charging too high a price for its products, or by failing to make itself really efficient.

Clauses 4, 5 and 6 deal with Dominion, Colonial and Imperial preference, and Clause 7 with preference in the case of certain foreign goods. Clause 8 refers to the charging of duty in the case of composite goods; generally speaking, the 10 per cent. general *ad valorem* duty will only be charged to the extent, if any, by which it exceeds the amount of duty chargeable under some other Act. Clause 9 deals with the power of the Board of Trade to require information as to the condition and progress of trades and industries which are benefiting by the general *ad valorem* or additional duties, and is a necessary provision for securing for the Government the data which it needs to ascertain that an industry is making full use of and not abusing the protection which it has secured. Clause 10 safeguards industry in regard to the disclosure of such information.

Clause 12 defines the power of the Board of Trade to impose supplementary duties in cases of foreign discrimination. Clause 13 has been introduced to safeguard the *entrepot* trade and allows goods to be free of duty when imported with a view to re-export after undergoing a process which does not alter their form or character or merely after transit through the United Kingdom, or by way of transshipment. Clause 14 provides for the re-importation of goods which have been shipped from this country; provided the appropriate duties have previously been paid, and no draw-back allowed, the goods may be re-imported, either duty free, if they have not been subjected to any process abroad, or on payment of the duty corresponding to their increase of value in cases where they have undergone a process which has not changed their form or character. Clause 15 defines the value of goods for the purposes of the Act and is an improvement on the definition given in the Safeguarding of Industries Act. Clause 16 deals with the settling, by the arbitration of a referee appointed by the Lord Chancellor, of disputes as to the value of goods.

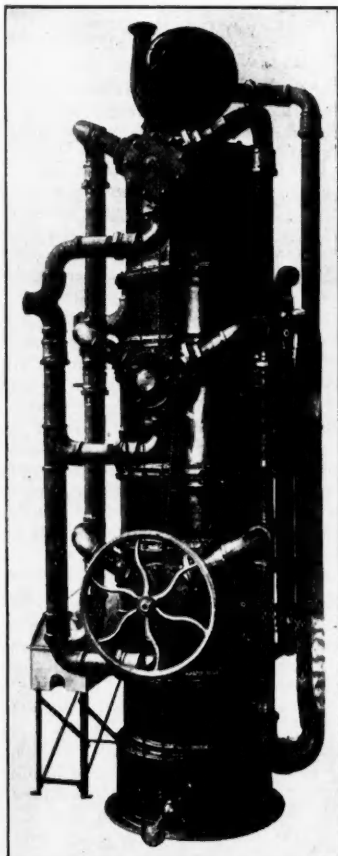
The Question of Draw-back

The First Schedule is the list of goods exempted from the general *ad valorem* duty, and has already been discussed. The Second Schedule deals with the vexed question of draw-back which will be operated on the recommendation of the Advisory Committee. Draw-back may be allowed on the exportation or shipment as stores, of goods in the same state as that in which they have been imported and which have not been used, either by the importer or by some person who has taken direct delivery from the importer. This appears to limit draw-back to certain specific cases, a limitation which should be in the interests of manufacturing industry. The Third Schedule contains supplementary provisions as to Imperial Preference.

The foregoing outline of the Act will give some idea as to how it will affect the chemical industry. It is an Act full of tremendous possibilities for British industry, but it must never be forgotten that it represents merely the first stage of an experiment, on the success or failure of which depends the whole future prosperity of this country, and perhaps also of the Empire. In framing this Act, the Government have endeavoured to provide the best conditions for the control of this delicate experiment. They have put the whole of the detailed work in the hands of the Import Duties Advisory Committee which has been given an entirely independent position, where it will be free, or ought to be free, from interference by Government Departments, from log-rolling and from political intervention.

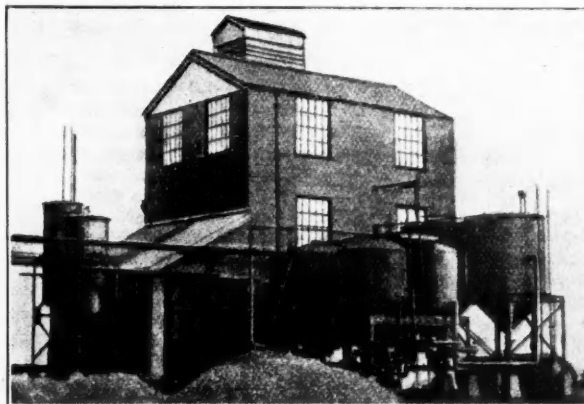
Lithopone Manufacture in Soviet Russia

It is reported that the first Soviet factory for the production of lithopone is now completed and operating. The plant is located in Leningrad and is known as the Vorovsky Lithopone Factory. No statistics are available regarding the capacity of the plant.

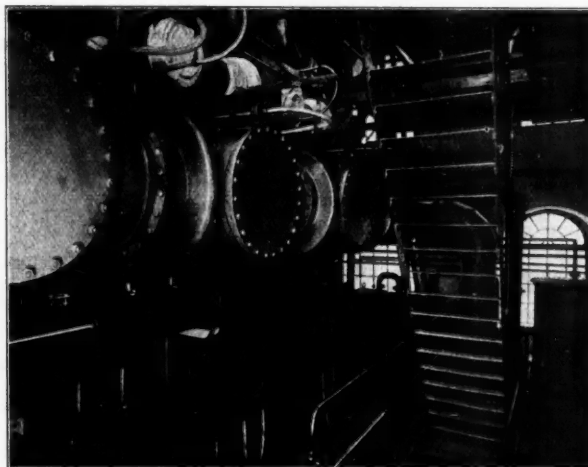


A TYPICAL SILICA GEL AIR DEHYDRATION PLANT OF THE SUPERIMPOSED TYPE.

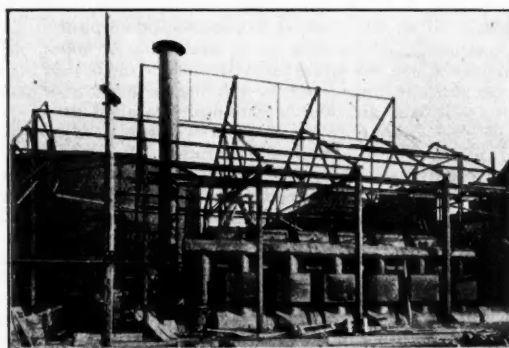
Dry air is now an essential feature in many phases of industry, one typical instance being found in the production of pig iron where the modern blast furnace uses at least 60,000 cu.ft. of air per minute, and the water content of this air may be 15 to 60 tons per day. The removal of this moisture by means of an adsorbent such as Silica Gel is essential for the efficient and economic working of the furnace. The recovery of volatile solvents, now used in large quantities in various manufacturing operations, is another instance where the use of an efficient adsorbent becomes essential for economic reasons. Silica Gel is also used in the refining of crude benzol, and similar hydrocarbon oils, eliminating the use of sulphuric acid as a washing medium.



BENZOL REFINING PLANT, TREATING 13,000 GALLONS OF CRUDE BENZOL PER DAY.



SOLVENT RECOVERY PLANT, CAPACITY 150 LB. PER HOUR OF A MIXTURE OF ETHYL ALCOHOL AND ETHYL ACETATE.



DRY BLAST PLANT, DEALING WITH 35,000 CUB. FT. OF AIR PER MINUTE.

Technical Applications of Silica Gel in Adsorption Problems

(Photographs reproduced by courtesy of Silica Gel, Ltd.)

Vanadium Catalysts for Phthalic Anhydride Manufacture

A Review of the Patent Literature

This subject is dealt with in the current issue of "Vancoram Review," which is published by the Vanadium Corporation of America, from which source the following notes are reprinted.

DURING the last decade of the 19th century the growing demand for phthalic anhydride for use in the preparation of xanthene and the indigoid dyes led to research toward the discovery of cheaper processes for its manufacture. A method for converting naphthalene to phthalic anhydride using sulphuric acid as the oxidising agent in the presence of a mercury salt as a catalyst was discovered by E. Sapper and patented by the Badische Anilin und Soda Fabrik in 1896. It was employed on an enormous scale in Germany in the manufacture of synthetic indigo; in fact it is said that the present contact process for producing sulphuric acid is a result of efforts to utilise the sulphur dioxide obtained as a by-product of this industry.

Early Experiments

When importations of phthalic anhydride from Germany were interrupted during the war, many attempts were made in America to utilise this sulphuric acid oxidation process as described in the patents and in chemical literature. Initial experiments by H. D. Gibbs and C. Conover working for the United States Bureau of Chemistry to reproduce this process were not entirely successful and indicated the desirability of finding a simpler and cheaper method. Earlier work of Gibbs on oxidation of toluene with air in the presence of a vanadium catalyst to benzaldehyde and benzoic acid suggested a similar process for phthalic anhydride. Laboratory results proved that high yields could be obtained by direct oxidation of naphthalene vapour mixed with air over a vanadium catalyst and a careful investigation was carried on to determine the best possible conditions of temperature, gas mixture, time of contact and condition of catalyst to produce the optimum yield. Naphthalene was melted and caused to flow continuously at a measured rate into a heated chamber where it was volatilised. The vapour was then mixed with at least four times the amount of air theoretically necessary to oxidise naphthalene to phthalic anhydride. This gas mixture was passed into a reaction chamber maintained at a temperature of 500° C. where it was forced into close contact with oxides of vanadium. Phthalic anhydride was separated from the other oxidation products and the unchanged naphthalene by fractional sublimation. The final product was remarkably pure and quite free from chlorine and sulphur, the common impurities of the German product.

Later Developments

The next year C. E. Andrews (U.S. Pat. 1,336,182 of 1919) introduced a process which consisted primarily of heating together a mixture of naphthalene and concentrated sulphuric acid in the presence of a vanadium oxide catalyst. At about the same time A. Wohl, in Germany (Brit. Pat. 145,071 of 1920) produced phthalic anhydride by passing a mixture of naphthalene vapour and air over a vanadium catalyst at a temperature of 380°–400° C. The catalyst was prepared by impregnating pumice with a colloidal solution of vanadic acid mixed with starch or finely divided blood charcoal and heating in air to burn off the carbonaceous matter. Further work of Gibbs with E. I. du Pont de Nemours and Co. (U.S. Pat. 1,444,068 of 1923) has shown that finely-divided vanadium pentoxide does not give so good a yield of phthalic anhydride as the coarser form that has been sintered by heating to about 550° C. or fused and powdered. This has been confirmed by other workers. According to U.S. Pat. 1,458,478 of 1923, vanadium pentoxide may be fused, poured into moulds, suddenly chilled and the solid powdered or granulated. U.S. Pat. 1,463,206 of 1923 recommends the addition of kieselguhr before moulding and grinding. In either form the powdered vanadium pentoxide is mounted upon a support, such as broken bricks or small metal particles.

The most extensive work on this vapour phase oxidation of hydrocarbons was that carried on by Weiss and Downs and the Barrett Co. which resulted in a series of patents. The main contribution which they have made to the solution of the problem is in controlling the temperature conditions

so as to secure the minimum amount of destructive oxidation. In the catalytic oxidation of naphthalene the reaction may proceed according to the following equations:—

- (1) $2C_{10}H_8 + 3O_2 = 2C_{10}H_6O_2 + 2H_2O$
alpha naphthoquinone
- (2) $2C_{10}H_8 + 9O_2 = 2C_6H_4(CO)_2O + 4CO_2 + 4H_2O$
phthalic anhydride
- (3) $C_{10}H_8 + 6O_2 = C_6H_4O_2 + 4CO_2 + 2H_2O$
benzoquinone
- (4) $C_{10}H_8 + 9O_2 = C_4H_2O_3 + 6CO_2 + 3H_2O$
maleic anhydride
- (5) $C_{10}H_8 + 12O_2 = 10CO_2 + 4H_2O$

Under the usual oxidising conditions, the formation of naphthoquinone and benzoquinone is found to be quite small. Therefore, only equations 2, 4 and 5 are to be considered in appraising the efficiency of a catalyst to be used for the commercial production of phthalic anhydride from naphthalene. Reactions 4 and 5 are to be reduced to a minimum, as not only does the production of maleic acid or the complete reduction to CO₂ represent a loss of naphthalene, but it also complicates the recovery of phthalic anhydride and greatly increases the exotherm of the reaction which will cause a still greater violence of the oxidation.

A Large Scale Unit

In *J. Soc. Chem. Ind.*, 1926, 45, 188T and in U.S. Patents 1,374,720-1 of 1926, J. M. Weiss and C. R. Downs have described a large-scale unit consisting of a nest of many square catalyst tubes, set into perforated plates and surrounded by the cylindrical jacket of the converter. In order to regulate the temperature of the catalyst chamber, the interstices between the tubes and the jacket are used for a vapour bath consisting of mercury or melted sulphur. To start the reaction, the mercury is boiled and a mixture of naphthalene and air in the correct proportions is passed downward through the catalyst tube. As soon as oxidation sets in, the excess heat caused by the reaction is removed by the mercury, bringing the mercury to the boiling point, approximately 400° C. The vaporised mercury is again condensed in the upper part of the apparatus as it pre-heats the entering naphthalene-air mixture. The gaseous products of the reaction pass from the base of the vessel to fractional condensers, water scrubbers, etc., in which the products and unchanged raw material are separated and recovered. Various other vanadium catalysts have been used for this process, the application of an iron-vanado-chromate as a catalyst for the oxidation of naphthalene being described in U.S. Patent 1,560,297 of 1925.

E. B. Maxted (*J. Soc. Chem. Ind.*, 1928, 47, 383T) states that "in a preliminary investigation several years ago, it was observed that certain vanadium salts, particularly the vanadates of tin and of bismuth constitute oxidation catalysts of wide applicability, and that oxidation with air in the presence of these contact substances may be applied not only to hydrocarbons but also to various other derivatives, including those containing halogens or nitrogen. This was found especially to be the case with tin vanadate, which becomes active at an abnormally low temperature compared with other vanadium compounds." He goes on to show that the outstanding points in regard to the oxidation of naphthalene with these vanadates are first—that the percentage yield of product is considerably higher (80 per cent. and even higher if special conditions are employed) than that obtained with the other substances studied; second—the maximum space-time yield also is far greater than the normal value, approaching in some cases ten times the figure observed for other compounds.

A. E. Craver and the Barrett Company (U.S. Pat. 1,489,741) recommend a mixture of vanadium pentoxide (65 per cent.) and molybdenum oxide (35 per cent.) with small quantities of either manganese peroxide or copper oxide. A temperature of 450° C. and a time of contact of half a second are mentioned for this catalyst. A. P. Green and J. W. Porter (1920) produce phthalic anhydride by oxidising naphthalene or other suitable volatile hydrocarbons such as alpha or beta-

methyl naphthalene, tetrahydro-naphthalene or alpha-naphthol by treatment (at 300°–650° C.) with air charged with vanadyl chloride (1 gram of vanadyl chloride per 100 litres of air).

An Interesting Modification

An interesting modification is that of W. A. Caspari (Brit. Pat. 263,201 of 1926). A colloidal suspension of vanadium oxide in molten naphthalene is first prepared and a spray of this solution in which the volume ratio of naphthalene vapour to air is approximately 1:25 is passed through the heating chamber raised to a temperature of 300° C. where oxidation takes place. The phthalic anhydride formed which may contain a small proportion of naphthoquinone is condensed as a sublimate together with the greater part of the catalyst which is recovered substantially unchanged or in the form of a lower oxide. German Pat. 478,192 of 1924 (*Verein für Chemische und Metallurgische Produktion*) claims improved results are obtained by supporting the catalyst on a smooth or polished metal carrier. Thus a contact mass may be prepared by immersing small pieces cut from a polished sheet of aluminium into molten vanadium pentoxide. A. Kuhlman (French Pat. 646,263 of 1927) claims a catalyst mass composed of the lower oxides of vanadium. Pumice is impregnated with a solution of vanadyl oxalate obtained by dissolving vanadic acid in oxalic acid in excess and heating to 270° C.

Reduction of Phenols to Aromatic Hydrocarbons

By W. G. Rumbold

THE reduction of phenols to hydrocarbons in a commercial way is recognised as a desirable development, especially in the case of low temperature coal tars which contain high percentages of those bodies. With a large scale development of low temperature carbonisation, it is obvious that there would be a great over-production of tar acids so that their value as such would be low. A good deal of work has been done in the field of phenol reduction with a certain degree of success, but lately the methods for the reduction of tar phenols have been considerably improved by the work of Franz Fischer, Theo Bahr and A. J. Patrick in the Kaiser Wilhelm Institut für Kohlenforschung at Mülheim. Some particulars of this work are given by the above three workers in *Brennstoff-Chemie* for February 1.

The reduction of phenols with hydrogen under a pressure of 100 atmospheres or more, and with catalysts such as aluminium or molybdenum oxides sulphides, etc., produces, besides reduction, a good deal of hydrogenation with the production of hydro-aromatic compounds. Phenols can be reduced thermally, and also by the use of catalysts under pressure, with good results, but the necessity to employ energetic reaction conditions, such as high temperature or high pressure, stimulated the authors to attempts to effect the reduction under simpler conditions. The development of catalytic methods in recent years whereby reactions can be effected at lower temperatures and lower pressures, made it probable that the reduction of phenols could be simplified.

Nickel as a Catalyst

Sabatier reduced phenol, cresol and dioxybenzol at temperatures ranging from 250 to 300° C. to the corresponding hydrocarbons at ordinary pressure in the presence of an active nickel catalyst, but the drawback to the use of such a catalyst is the great sensitiveness to contact poisoning by the impurities in the phenols, and the fact that the temperature range is a very limited one. At too low temperatures the products of reduction are mainly hydro-aromatic compounds, while at too high temperatures the phenols become decomposed with a large production of methane.

In their investigations, the authors used different catalysts, including the so-called water splitting contacts. They found that the catalytic properties of the contact material for the high pressure reduction at temperatures of 50 to 80° C. could be greatly improved to permit reduction at ordinary pressure at fairly moderate temperatures. This was especially the case with molybdenum oxide contacts. With *m*-cresol and hydrogen, in the presence of this contact, toluol forms below 330° C. and is quickly produced at temperatures of 360 to 380° C. The toluol formed separates from the reduction water, and also from the unchanged cresol. With this catalyst, the authors have reduced phenol and its homologues, and also

Large quantities of phthalic anhydride are now made in Germany, Great Britain and the United States. Although recent production figures for the United States are not available, the average rate of increase during the past five years probably approaches double the rate during the preceding ten (1916-1926) during which the average yearly increase was 400,000 lb. per year (from zero to 4 million). When the Bureau of Chemistry first released Gibbs' description of his process in 1917, Monsanto Chemical Works undertook its transposition to factory operation and commercial shipments were made as early as 1919. Several companies are now marketing this compound. The availability of this cheaper, better phthalic anhydride has opened the field to new uses. While still important, its use for the manufacture of phenolphthalein may become only a minor application. Anthraquinone made from phthalic anhydride and benzene has displaced the older anthracene process; a reliable source of high quality anthraquinone at a reasonable price has made possible recent progress in the production of vat colours.

Phthalic anhydride as an intermediate for di-ethyl phthalate enters the perfume trade. However, the largest potential fields are only now being developed—plasticisers for the lacquer industry such as dibutyl phthalate and that very important development—synthetic resins of the glycerol phthalate type—such as glyptal, the rezyls and teglacs.

crude mixtures of the same, at ordinary pressures, and temperatures of 350 to 400° C.

Of all the contact materials investigated, including chromium, uranium, zinc, aluminium and other compounds, molybdenum, in the form of its oxides proved the most effective but the authors say that one or the other of the remaining metals named in some form other than that used, might still be found to be equally good. The efficiency of the catalyst depends on the method of its preparation; the most active was the oxide obtained from the nitrate produced by dissolving the metal in nitric acid. In the patents of the I. G. Farbenindustrie A.-G. it is shown that molybdenum catalysts are insensitive to catalyst poisons, and the authors state that, under the conditions employed by them, the molybdenum catalysts used were affected neither by sulphur-containing gases nor by the presence of sulphur in the raw materials, such as are found in low temperature tars.

Perfect Conversion of Phenols

With these catalysts there is obtained in the beginning a perfect conversion of the phenols into the corresponding hydrocarbons, but later, side reactions occur which reduce the activity of the contact material. The catalysts can be regenerated by simple oxidation in air, with the precaution that high temperatures be avoided in this oxidation. The reducing gas is, of course, hydrogen, but in place of pure hydrogen, mixtures like lighting gas or coke oven gas may be used with equally good effect.

In the temperature range of 350 to 400° C., phenol itself, the three isomeric cresols, and xylool in mixtures can be reduced to their corresponding hydrocarbons. The splitting off of the methyl groups, which occurs at higher temperatures, does not occur under the conditions employed by the authors. The employment of iron tubes instead of glass or copper tubes, does not induce cracking of the phenols or the resulting hydrocarbons at the temperatures employed. The hydrocarbons obtained consist up to 80-90 per cent. of aromatic hydrocarbons.

In all the cases investigated, aromatic hydrocarbons corresponding to the original compounds were obtained. In place of phenol, phenol in tar fractions can be reduced to yield phenol-free tar oils with a corresponding increase in the quantity of aromatic constituents. With pressures of from 1 to 20 atmospheres it was found that the pressure accelerated the reduction of the phenols in the presence of the molybdenum oxide contact. While at pressures up to 10 atmospheres the velocity of conversion of phenols is essentially increased, the conversion proceeds more rapidly at pressures up to 20 atmospheres, especially in the case of phenol-containing tars, but there is also a decided hydrogenation observed with the production of hydro-aromatic compounds.

The Institute of Chemistry

Fifty Fourth Annual Meeting

At the fifty-fourth annual general meeting of the Institute of Chemistry held in the Hall of the Institute, Russell Square, on Tuesday, March 1, the president, Dr. G. C. Clayton, presented the Meldola Medal, the gift of the Society of Maccabaeans, to Dr. G. F. Marrian, of University College, London, in recognition of his researches on vitamins and hormones. The annual accounts were received and adopted on the motion of Mr. Patrick H. Kirkaldy, hon. treasurer, who made a special appeal for the Benevolent Fund.

Dr. Clayton, in moving the adoption of the annual report, said that the roll of Fellows and Associates of the Institute exceeded 6,000. The proposal to petition for a Supplemental Royal Charter, with a view to securing for the members the use of the title "Chartered Chemist," had been postponed, because the Pharmacy and Poisons Bill, which contained a clause dealing with the use of the word "chemist" and was before the last Parliament, had not been re-introduced. In any event, amendments would be made in the Petition and Supplemental Charter in order to remove certain misunderstandings which had arisen with other organisations.

The Institute had been represented on the Joint Chemical Committee on Patent Law Reform, members of which had given evidence before the Board of Trade Committee, and a form of contract of service for chemists in industry had been prepared by a joint committee of the Institute and the Association of British Chemical Manufacturers. The Public Appointments Committee had prepared a memorandum on the administration of the Food and Drugs (Adulteration) Act for the Departmental Committee on Food, which would, no doubt, be considered when the proceedings of the latter Committee were resumed. The Report showed that many important papers had been read before the local sections, of which there are fourteen in Great Britain and Ireland, and in Malaya, New Zealand and South Africa.

High Examination Standards

The professional examinations of the Institute were maintained at a high standard, and the examinations, arranged by the Board of Education and the Institute jointly, for National Certificates in Chemistry were proving of real value in co-ordinating and raising the standard of chemical training in technical colleges.

Having referred to the separate publication of Dr. Tocher's lecture on "What is Probable Error?", Dr. Vargas Eyre's Streathfield Memorial Lecture on "Fermentation," and Sir Frank Smith's Gluckstein Memorial Lecture on "Chemistry and the Community," the president emphasised Sir Frank Smith's view that even in these difficult times, chemical research must be continued. New problems were awaiting solution, and many which had been solved had yet to be developed on the large scale. The times had not been favourable for making radical changes or for launching out in new directions, but the chemical industry was an excellent barometer for indicating the outlook in industry generally, because it supplied some of the materials required for so many industries, and he thought that signs of a change for the better were not lacking.

The Appointments Register Committee reported that about 190 (or rather more than 3 per cent.) of the members were without appointments, and asked that suitable vacancies should be brought to the notice of the Institute. Incidentally, the president mentioned that the number of unemployed qualified professional chemists in Germany was 1,500 out of about 10,000—15 per cent. Remarking that the duties of the censors of the Institute had been light, the president deplored the practice of certain institutions, which disregarded professional tenets by soliciting practice and giving certificates for the purposes of advertisement.

The officers for the ensuing year were elected as follows: President, Dr. G. C. Clayton; vice-presidents, Dr. F. D. Chattaway, Mr. L. Eynon, Dr. G. G. Henderson, Mr. E. Hinks, Mr. B. F. Howard and Professor Arthur Smithells; treasurer, Mr. P. H. Kirkaldy.

Vanillin Imports into the United States

IMPORTS entered for consumption during 1931 decreased 87 per cent. to 3,453 lb., from 27,674 lb. received in 1930. Incoming shipments of ethyl vanillin, however, doubled from 2,087 lb. in 1930 to 4,154 lb. in 1931.

Chemical and Allied Industries Dinner

A Plea for Unification at Newcastle

THERE was an unusually representative gathering at the Chemical and Allied Industries North-East Coast dinner, which was held at the Royal Station Hotel, Newcastle-on-Tyne, on February 26. The organisations associated with the function were the Chemical Society, the North-East Section of the Institute of Chemistry, the Newcastle Section of the Society of Chemical Industry, the North-East Section of the Institute of Metals, the North of England Gas Managers' Association, the Newcastle Chemical Industry Club and the Northern Section of the Coke Oven Managers' Association. Mr. F. P. Tarratt, engineer of the Newcastle and Gateshead Gas Company and vice-president of the Institution of gas engineers, was in the chair, and Mr. J. W. Craggs, hon. secretary of the Newcastle Section of the Society of Chemical Industry, acted as dinner secretary.

Dr. P. L. ROBINSON proposed the toast of "The Kindred Societies," and coupled with it the name of Dr. R. Seligman, president of the Institute of metals. Dr. Robinson said they were linked together by their common interest in chemistry, and he suggested that there would be advantages in their all being linked up in one large society, whose records of work should be looked after centrally, instead of being scattered about in smaller units.

The Task of the Scientist

Dr. R. SELIGMAN, responding, said it was a great pleasure to see such a gathering composed of so many different elements but with a common interest. Referring to current affairs he said: "I am tired of defending science from the charge of having brought about much of the malaise from which the world is suffering to-day. By making two blades of grass grow where one grew before, science is said to have made herself responsible for the plethora of goods; but I deny that science is responsible for any of the troubles from which the world is suffering. Is it not time we realised that, in the constant effort to eliminate human effort from industry, we have acted as if that elimination were an end in itself? We are certainly nowhere near the end of what organisation can do for industry. In this country, seven men at work have to carry two idle men on their backs; in America five, or even as few as three men are said to carry two idlers on their backs. I am afraid that we have got ourselves into a mess by forgetting the cardinal fact that our efforts should be, not for the benefit of the few, but for mankind at large. The object of labour-saving is not to make fewer people do more and harder work but to lighten the efforts of all and enable them to devote themselves to things of mind and body which lead to fuller and more rounded lives."

Managerial Qualifications

Mr. E. M. MYERS, chairman of the Northern Section of the Coke Oven Managers' Association, in proposing "Local Industrial Development" coupled with it the name of Mr. John E. Cowen, chairman of the Newcastle and Gateshead Gas Company. Mr. Myers pointed out that there were still grave defects in the industrial system and said an essential for development was peace between employer and employed. Unfortunately they had not been blessed with continued peace in industry. "One of the causes," he continued, "may be that the qualifications which people in important managerial positions possess are often social and residential. In many cases they have been compelled to take on these important positions though ill-fitted to do so."

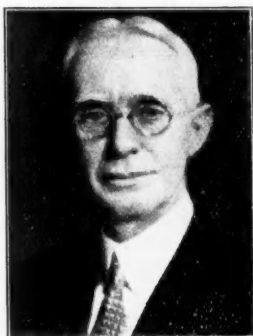
Mr. JOHN E. COWEN, replying, denied that there was any truth in the oft-repeated assertion that Tyneside had ceased to progress as an industrial centre. "This district," he said, "has been noted for the men of ability it has produced in the past, not only among commercial men but among technical and scientific men. I venture to suggest that they will again bring Tyneside into the forefront of the productive and manufacturing areas of the world." There had been, he said, signs of industrial development in several directions in recent years and he referred to the manufacture of switchgear at Hebburn, Diesel-electric rail-traction and Armstrong-Saurer road vehicles at Scotswood and the manufacture of mechanical stokers of a special type at Blaydon. All these developments showed that the district was alive to the future.

American Institute of Chemists

Award of the Annual Medal

THE Medal of the American Institute of Chemists for 1931 is to be awarded to Dr. Charles H. Herty, who, in the words of the President of the Institute, has "held to the ideal of making the United States chemically self-sufficient, dependent on no foreign nation for industrial and pharmaceutical necessities."

Dr. Herty first made himself felt as an economic influence when his researches at the University of Georgia revolutionised the turpentine industry. The Herty method of collecting turpentine greatly increased the productiveness of the pines; other discoveries corrected the then existing wasteful methods of turpentine orcharding. Rising to prominence, Dr. Herty served for two years as president of the American Chemical Society, 1915-16, during which time he carried out a chemical census which presented the United States Government with a detailed view of the chemical potentialities of the country. In 1917, as editor of the *Journal of Industrial and Engineering Chemistry*, he promoted that



DR CHARLES H. HERTY.

publication to a position of guiding influence among American chemists. After the war, Dr. Herty threw himself into the fight for a tariff law which would protect the American chemical industries and ensure a supply of medicinals, dyes, and other essential chemicals. In carrying on this fight he resigned his editorial position and became president of the Synthetic Organic Chemical Manufacturers' Association, and under the tariff Act of 1922, the chemical industry in the United States has grown and prospered. In 1926 he became adviser to The Chemical Foundation, Inc., and assisted the Foundation's activities in aiding American chemical industry and in educating the public to the importance of chemistry.

The Medal of the American Institute of Chemists is awarded annually for "noteworthy and outstanding service to the science and profession of chemistry in America," and Dr. Herty is fully entitled to it, in recognition of his efforts on behalf of American chemists and the American chemical industry which extend over a long period of years. The presentation of the medal will take place on the occasion of the annual meeting of the Institute to be held in New York in May. Last year this medal was presented to Andrew W. and Richard B. Mellon.

Competition between Coal and Oil

Sir John Cadman on the Future

AT a recent meeting of the Royal Institution, Sir John Cadman gave an address on "Petroleum." He pointed out that the world's production of petroleum had risen from 70,000 tons to nearly 200,000,000 tons in the relatively short space of 70 years and that this rapid development had been caused by the constant application of science.

Dealing with the scientific utilisation of fuel reserves, Sir John said Great Britain regarded coal and oil-producing countries as actual or potential sources of revenue. The railway companies consumed annually 13,000,000 tons of coal, but oil-electric locomotives could perform the work on 1,600,000 tons of oil. Coal-importing countries shared none of our national sentiment about coal, and if oil offered advantages in economy they would turn to the liquid fuel. If, therefore, Great Britain adhered to a policy of coal utilisation for the sake of its mines we might well burden our industries with yet another handicap. Despite the inroads oil might make, there would still be a wide field for coal. The construction of motor cars, compression ignition engines, and oil-electric locomotives, for example, necessitated the consumption of large quantities of coal, and an export of such mechanisms was virtually an export of coal with the beneficial difference that we sold, not a raw material, but a finished product, to which many branches of British industrial skill and science had contributed.

Letters to the Editor

Hospitals and "Safety First"

To the Editor of THE CHEMICAL AGE.

SIR,—The resources of hospitals throughout the length and breadth of the country are being strained to the utmost to meet the demands made upon them by the large number of casualties on the roads. The British hospitals deserve the sympathy and support of all. This can be expressed in various ways. Some can help directly with financial assistance or personal service. Others can only give their sympathy to work which commands the respect of the whole community. But there is one way—often overlooked—in which everyone can do his or her share, and that is by the observance of safety first principles when using the roads and in everyday pursuits. The National Safety First Association is waging a continuous campaign against accidents, over 75 per cent. of which are avoidable by the exercise of care and forethought. In this work it has the co-operation of all concerned with road transport, first aid, health, fire-fighting, etc., etc.

We appeal to all to promote good fellowship among all users of the highway, by exercising care and consideration for others, and particularly by following the advice contained in the Ministry of Transport's Highway Code, and in the posters and other literature issued by the National Safety First Association. By so doing they will take their part in the effort towards mitigating the large number of unnecessary accidents and the subsequent loss of life and limb, time and money; and would at the same time relieve the hospitals of at least a little of their burden.—Yours faithfully,

ALBERT (Duke of York),

Patron, The National Safety First Association.

ARTHUR STANLEY,

President, The British Hospitals Association.

HAROLD R. PINK,

Chairman of Council, The British Hospitals Association.
12 Grosvenor Gardens,
London, S.W.1.

A Sample of National Economy

To the Editor of THE CHEMICAL AGE.

SIR,—Our politicians have been shouting "Economy" from the housetops for several months, and our industrialists have been telling the Government how to economise on our national services. Only a couple of weeks ago I read in THE CHEMICAL AGE the statement of the Federation of British Industries' case for national economy, wherein it was urged that the elaboration of Government administrations should be reduced. We have paid up our income tax with a loyalty that is little short of amazing, and we have greeted the passing of the Import Duties Act as setting the seal upon the determination of our administrators to cut their coat according to their cloth.

And now, to my astonishment, I find that the Government is contemplating the spending of millions of pounds in directions where real economy might well have been practised. Reports of Parliamentary proceedings on Monday last reveal that Civil Estimates and Estimates for Revenue Departments were laid before the House of Commons involving a total of no less than £150,492,000. Some of the items have doubtless been cut to the barest necessity, but let us look at a few of the figures that have a more or less direct bearing on the chemical industry. I take the following items at random:—

	£
Government chemist	22,000
Empire Marketing	100,000
Scientific investigation, etc.	75,000
Universities and Colleges, Great Britain	900,000
Department of Overseas Trade	123,000
Beet sugar subsidy, Great Britain	50,000
Department of Scientific and Industrial Research ...	160,000

These items alone represent a total of £1,430,000
Some, at least, of the departments represented by the above figures should be self-supporting, while in other cases the promise of economy seems to have been entirely overlooked. Do not these figures suggest that now that the State has collected an unprecedented amount of money from the hard pressed taxpayer, and sees a prospect of collecting still more from the foreigner, it is looking round for ways of spending it as fast as it gets it?—Yours faithfully, "ECONOMIST."

News from the Allied Industries

Rubber

NEGOTIATIONS HAVE BEEN CARRIED ON at The Hague between Mr. Luytens, representing the Government of the Dutch East Indies, and a number of advocates of restriction of the rubber crop. Mr. Luytens showed that he was opposed to any restriction, pointing out that many of the rubber estates in the East Indies had already lowered their cost price considerably. This opposition, however, is not to be taken as conclusive evidence that rubber restriction is impossible, though it was thought to strengthen the case of those who have doubted its early introduction. The British Government, it is reported, is sympathetic to restriction but has not yet thought fit to bring pressure to bear to secure its adoption by all growers, British as well as foreign.

Beet Sugar

THE ENGLISH BEET SUGAR CORPORATION, the lessees of the Kelham (Newark) beet sugar factory, have intimated to the farmers who have offered to accept contracts for beets for this season's campaign, that it is not possible to obtain a sufficient acreage to work the factory during the coming manufacturing season. The company point out that only when the growers collectively offer an acreage and deliver from such acreage a reasonable yield to enable the factory to work at full capacity a price reasonable to the grower can result. The acreage offered has fallen much short of that, hence the decision to close down. The factory was erected in 1921 by the Home Grown Sugar Company. It was leased in 1924 to the English Beet Sugar Corporation, which controls factories at Cantley, King's Lynn, Ely, and Ipswich.

Non-Ferrous Metals

SIR AUCKLAND GEDDES, chairman of the Rio Tinto Co., Ltd., and the Rhokana Corporation, Ltd., has joined the Copper Conference at New York, after an agreement temporarily to continue the present marketing rules while efforts persist for reaching a new agreement. After the meeting on March 1, sessions were postponed until Thursday, March 3, when the temporary extension of the marketing rules lapsed. Private conversations between producers continue, in an attempt to work out a new general curtailment plan.

THE ESTABLISHMENT OF A CONTINENTAL ZINC UNION has been one of the objects of the German zinc foundries since the recent meeting of the International Zinc Union in Paris made it appear likely that the latter will be dissolved. This Continental Zinc Union, in which an attempt would be made to get Germany, Poland, Belgium, France, Norway, Spain, Italy and Czechoslovakia to participate, is intended as a counter-measure against the expected British Empire zinc tariff union. Negotiations are proceeding, and it is expected that an agreement will shortly be reached.

Iron and Steel

ACCORDING TO *The Birmingham Post* the cloud has yet to lift from the iron trade. No new initiative revealed itself at last week's market in Birmingham. So far as Continental iron and steel are concerned prices have already adjusted themselves to the 10 per cent. duty. In a few directions the duty will confirm diversions of trade due to the devaluation of the pound, and it will give the British producer extended competitive power in his home market. There have been few dealings in Continental material. Reserves in this country are considerable, and the speculative spirit has been in suppression. The great obstacle to freer trading is the backwardness of consumptive demand. The Central Pig-Iron Producers' Association held their usual monthly meeting at Birmingham on February 25, when Sir Francis Joseph presided. It was decided to make no change in prices.

Turpentine

FOLLOWING the formation of a cartel of turpentine producers last August which comprised 300 manufacturers or 98 per cent. of the total production of Polish turpentine, a similar arrangement has been completed among turpentine refineries. It is reported that the principal purpose of the producers' cartel will be to settle numerous marketing difficulties as well as to maintain present prices.

Artificial Silk

A NEW CONCERN STYLED THE ITAL-RAYON Co. has been formed at Milan to sell the entire rayon production of the three companies Snia Viscosa, Chatillon, and Soc. Gen. Italiana delle Viscose. This company, formed by the co-operation of the groups involved, will regulate the merchandising of Italian rayon at home, as well as abroad, where its reputation is steadily improving. It has reached an agreement with the producers in Germany for the sale of Italian rayon there. The German company Kunsteide Verkaufsburo, G. m. b. H., has already been formed.

Detergent Trade

THE REICHSTAG Commission of Inquiry has completed its investigations of the German soap and cosmetics industry and has published its report, which deals with three divisions of the industry, as follows: (1) Soap and detergents, (2) cosmetics, and (3) perfumery. The total value of production of these industries combined is estimated at 570,000,000 marks (exclusive of the value of by-products), of which 400,000,000 marks represent the production of the soap branch. Outstanding features in the development of this industry is the increase of 300 per cent. since pre-war years and the growing popularity of the oxygen containing type of detergent, the annual production of which is valued at 130,000,000 marks.

Boot and Shoe Trade

A PROGRAMME OF CO-OPERATIVE WORK by the research associations of the rubber industry and the boot trades has been arranged for the purpose of settling, if that is possible, the controversy about the merits of leather and rubber. There has been a great increase in recent years of the use of tough rubber soles for all kinds of footwear. The Rubber Research Association is studying several important properties of soleings, such as abrasion resistance, flexing, permeability and thermal conductivity. Measurements of similar characteristics of leather are being made by the Boot Trade Research Association. Comparisons between the two sets of data may yield exact knowledge of the causes of discomforts ascribed to rubber, and suggest remedies.

Dyeing Trade

CONFIDENCE IN THE FUTURE was the keynote of the speech of Mr. George Douglas, chairman of the Bradford Dyers' Association, Ltd., at the annual meeting of shareholders held in Bradford, on Monday, February 29. The first three-quarters of 1931, he said, had been the worst in the Association's long experience. When the country went off the gold standard, however, the whole outlook improved, particularly in the home trade where the British manufacturer was at length able to meet the competition of imported fabrics. Distributors who had been long engaged in selling foreign-made articles were in many cases astonished to find how their requirements could be met at home. With the position stabilised by tariffs, there is every prospect of a very full recovery of our home market and, with a wide Empire preference development, of regaining the major share of the imports required by the Dominions and Colonies. The export trade had received a heartening stimulus from the drop in sterling exchange, though this advantage became less apparent as competing countries also went off gold. In addition, the financial exchange restrictions imposed in so many countries were hindering would-be buyers who possessed the means from being able to complete any transactions. Referring to the effect of the working of a cartel upon the dyeing trade, Mr. Douglas pointed out that one wing—the I. G.—has sought modification of its contracts, which run well into the year, on account of this country's departure from the gold standard, whilst another wing—the British Dyestuffs Corporation, now absorbed in the I.C.I.—cannot see its way to delay making a big advance of prices. In his view they are in too great a haste to improve their profit position, and they would do better first to get the benefit of the increased volume of business arising out of the exchange position and improved trade in this country. Five new directors were added to the Board: Messrs. G. A. Blakey, W. Schofield, A. C. Simpson, J. Wilson and W. Wilson.

The British Industries Fair, 1932

Satisfactory Results Anticipated in the Chemical Section

It is the consensus of opinion among exhibitors in the Chemical Section at Olympia that this year's British Industries Fair has been very satisfactory from the point of view of the



WHIFFEN AND SONS, LTD.

manufacturer. Inquiries have been generally received in much greater numbers than last year, but what is still better, a larger proportion will unquestionably lead to new business. Many definite orders have also been booked, and it is reported in one instance that the expectation of the tariffs which have now come into operation was largely responsible for the re-starting of an old business for which a substantial order for chemicals has been received. In the main, inquiries have been forthcoming from those countries of North Europe which are still on the gold standard, particularly Denmark, Sweden, and Holland. We give below a few opinions gleaned from individual exhibitors.

A. BOAKE, ROBERTS AND CO., LTD.: Inquiries received this year have been much the same as on previous occasions, but it is expected that a much larger proportion will mature. Hitherto the foreign visitor has not been so seriously interested as on this occasion. Foreign prospective buyers have come chiefly from northern European countries which are still on the gold standard. Inquiries received have been fairly well distributed over the complete range of products which they manufacture.

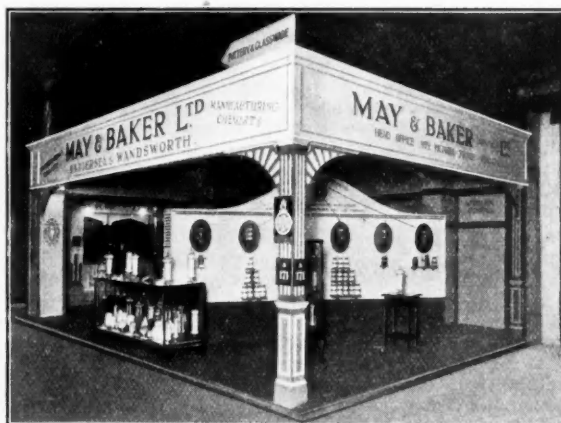
W. J. BUSH AND CO., LTD.: Many new inquiries have been received for their established products, such as vanillin and

HOPKIN AND WILLIAMS, LTD.: This firm have been rather struck by the exceptional interest taken by both home and Continental visitors. Amongst others, they have had inquiries from Denmark, Sweden, Poland, Czechoslovakia, and Spain. Their hippuric and malonic acids have attracted considerable attention.

HOWARDS AND SONS, LTD.: Inquiries for solvents have been slightly greater than at last year's Fair, but pharmaceutical products have been more or less on the same level. In the case of solvents the inquiries have been fairly well spread over the entire range at present manufactured, but special interest has been shown in ethyl lactate, methyl lactate, (which is new) and methyl ethyl ketone. They have also had numerous inquiries for Flodia, which is a new fixative for soap perfumery.

MAY AND BAKER, LTD.: The number of serious inquiries received at this stand has been very gratifying. The foreigner, visiting this year's Fair, has shown a greater inclination to "buy British" and in view of the depreciated value of sterling he is apparently of the opinion that *this is the time to buy*. The number of American visitors has been noticeably small. Continental inquiries have come chiefly from Denmark and other northern European countries. Special interest has been shown in the display of bromides produced from Empire bromine.

SHAWINIGAN, LTD.: It is the personal opinion of this firm that the Fair has been very satisfactory. Their vinyl resins



MAY AND BAKER, LTD.

have created considerable interest and many inquiries have been forthcoming.

THOMAS TYRER AND CO., LTD.: This firm has had a considerable number of inquiries which will ultimately bring new business. The bulk of the inquiries have been for stearates, as on previous occasions. They have recently completed an extension of their plant for the manufacture of these products, and are now making the zinc, magnesium, calcium and aluminium salts.

WHIFFEN AND SONS, LTD.: On the whole the amount of actual business done at this stand was about the same as last year. Most of the inquiries came from Danish and Scandinavian visitors, with a fair sprinkling from Germany, and a few from India. The callers were interested in fine chemicals generally.

On this page we give illustrations of three additional stands, which were received too late for inclusion in our issue of February 27. The Gas Light and Coke Company's stand depicted the harnessed flame, which symbolised gas in industry, as background to a tar still. Bold and bright posters announced the leading lines of the products works. Show-cases set out clearly the grades of road tar for various purposes, the ranges of pyridine bases marketed, the forms in which pure and crude naphthalenes are available, benzol, toluol, xylol, hydrocarbons and the phenols and cresols.



THE GAS LIGHT AND COKE CO.

aspirin, and also for newer products such as phenyl ethyl alcohol. They regard this year's Fair as being very satisfactory, and are of the opinion that new business will result.

From Week to Week

RECENT WILLS include—Mr. Samuel Hearon Johnson, of Stanhope House, Walton, Liverpool, chairman of J. H. and S. Johnson, Ltd., manufacturing chemists, Hatton Garden, Liverpool, £38,328 (net personalty £35,556).

MANUFACTURING AND SELLING RIGHTS for the Vickers works projection microscope have been taken over by Cooke, Troughton & Simms, Ltd., and Wild-Barfield Electric Furnaces, Ltd., have been appointed distributors.

THE ANNUAL DINNER of the London Section of the British Association of Chemists will be held at the Broad Street Station Restaurant, London, E.C. this (Saturday) evening at 6.30 for 7 p.m. The function will be an informal affair, and morning dress will be worn.

THE SIR EDWARD FRANKLAND MEDAL and Prize of the Institute of Chemistry for 1931 has been awarded to Geoffrey Dale Muir, of La Santarita, Lenzie. The Frankland Medal and Prize is awarded annually, and is open to all students of chemistry throughout the British Empire who are under 21 years of age.

THE FORMOSAN ELECTRIC POWER CO. is completing plant at Jingetsutan and plans to reserve a block of power for the production of ammonium sulphate. The average annual consumption of ammonium sulphate in Taiwan is 90,000 tons and the power company hopes to be able to supply the demand with the home product.

OXYGEN IS BEING MANUFACTURED in Barranquilla (Colombia) at a new modern plant owned by the Fabrica Nacional de Oxigeno y Productos Metalicos, S.A., backed by German and Colombian capital. It is stated that the entire production is being sold without difficulty in Barranquilla and other parts of Colombia.

ACCORDING TO A REPORT from Warsaw, Polish potash salts interests have practically reached agreement with the Potash Syndicate of Germany, and also with French potash interests, as to exports and on questions of general policy. The Potash Syndicate of Germany was incorporated to control the German potash industry under a special Act in 1919, which vests in the syndicate until 1953 sole right to sell, distribute, export and import potash and potash compounds. About £3,500,000 worth of German potash is sold to countries outside Germany every year.

THE RIVER SEVERN DEVELOPMENT ASSOCIATION has received a large number of inquiries for details of the Severn area as to its suitability for industrial development. In view of these inquiries a brochure, giving a brief survey of the whole industrial area of the Severn from Stourport to the Bristol Channel, has been compiled. This brochure is the first of its kind issued to embrace all the towns in the area, and a list is given of the more important industries established. Copies can be obtained from Mr. E. W. Bayliss, 16 Bridge Street, Birmingham.

THE DIRECTORS AND STAFF of the Woodall-Duckham Companies have been deeply touched by the expressions of sympathy received from all parts of the world in the loss sustained through the untimely death of their chairman, Sir Arthur Duckham. They have endeavoured to reply personally to all the messages of condolences they have received, but in case there has been any omission on their part, they would like to use this occasion to express their gratitude to all who have written. The sympathy expressed will be of great assistance in helping them to continue the responsibility of carrying on the business established under Sir Arthur's leadership.

A NEW ALLOY to be known as "Bal-nel" is being put on the market by a Clyde metallurgist. Considerable interest in the alloy has already been taken by local engineers and shipbuilders, and it has been successfully subjected to rigorous physical and chemical tests. It is a white lustrous metal the surface of which takes a very high polish, and it is claimed that it would be particularly applicable to machinery parts where the use of a stainless or rustless metal is required. In commercial practice, and apart from any electrolytic action, it has proved non-corrodible and non-stainable. Its physical properties are such that it can be readily machined, soldered, brazed, welded, and drop-forged.

MR. J. O. GIRSAVICIUS, B.A., Caius College, has been appointed to the Benn W. Levy research studentship in biochemistry at the University of Cambridge, valued at £100.

AFTER HAVING REDUCED ITS working time to 30 hours' per week, the management of a group of important metallurgical factories at Anzin (France) has dismissed all foreign employees with the exception of Belgians.

MALKINS BANK CHEMICAL WORKS, Sandbach, which form a part of Imperial Chemical Industries, ceased manufacturing operations on February 26, in accordance with the closing instructions. The majority of the workers, including shift men, are now dismantling the plant.

ITALIAN PRODUCTION OF SUPERPHOSPHATES during the first nine months of 1931 totalled 630,159 tons, or 42 per cent. less than for the same period of 1930. Consumption of fertilisers is far from satisfactory and the industry is working at only 30 per cent. capacity.

PROFESSOR W. E. GARNER was severely injured in an explosion which occurred while he was conducting an experiment at Bristol University on February 25. First-aid was rendered on the spot and he was afterwards removed to the Bristol Royal Infirmary. The explosion occurred while Professor Garner was demonstrating an experiment which he was to have described in his series of lectures on "Detonating Substances" at the Royal Institution on March 1, 8 and 15. Owing to the accident, the lectures have been cancelled.

THE SUPREME COUNCIL OF NATIONAL ECONOMY of the U.S.S.R. is said to have decided to concentrate all efforts on completion of a new plant for the utilisation of apatite-nepheline ores. From a chemical standpoint, these ores are being investigated for utilisation in glass, china, enamelware in which replacement of soda, borax, feldspar, etc., may occur, and in leather and rubber manufacture. Successful production is reported of phosphorus, fluorine compounds, aluminium oxide and salts.

THE SALE OF CHEMICAL PIGMENTS, paints, and varnishes is increasing throughout France. French manufacturers supply at present approximately 90 per cent. of the demand. Some pigments are produced in sufficient quantities to provide a surplus for export while others are imported in comparatively small quantities. Varnishes and nitro-cellulose lacquers which, only a few years ago, were imported from Great Britain and the United States are now produced in France and French industries are prepared to meet the demand.

AN ENZYME HAS BEEN FOUND in liver which transforms carotene, the yellow colouring matter of carrots, into vitamin A. This discovery has been made by Harold S. Olcott and Duane C. McCann, of the State University of Iowa. Preliminary experiments have shown that carotene was destroyed and vitamin A appeared when carotene was kept in a warm place for a time with fresh liver tissue from the bodies of rats that had lacked vitamin A. It was supposed that the reaction was due to an enzyme. Further research, using a liver extract instead of fresh liver, proved this to be the case. The investigators suggest that the new enzyme should be called Carotenase.

RETURNS FOR THE EXPORT OF CHEMICALS from Italy show an increase during 1930 in tannin extracts, in competition with similar French and German products. It is impossible to predict what further advances may be possible, especially since very cordial relations have been established with many foreign countries, provided Italian dealers are able to increase their contacts in those countries. The state guaranty on export credits is especially designed to aid trade with Russia, as there are practically no risks in sales to any other country. The preliminary survey of markets, and their continual study formerly followed only by single, private agencies without any possibility of control, is now facilitated by the activities of the Italo-Oriental Chamber of Commerce, which gathers and co-ordinates the news from all oriental countries and assists Italian exporters in all their dealings.

Obituary

MR. JAMES F. KNIGHT, who recently retired from the directorate of B. Pullar and Sons, dvers. Perth. Aged 67.

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Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2. at 1s. each.

Abstracts of Accepted Specifications

360,326-7. AMMONIUM SULPHATE AND SULPHITES. Verein für Chemische und Metallurgische Production, Aussig-on-Elbe, Czecho-Slovakia. International Convention date, March 26 and 28, 1930.

Waste gas from a sulphuric acid contact plant, and ammonia are passed into a saturated solution of ammonium sulphate to form ammonium sulphites and precipitate ammonium sulphate. The solution is treated with sulphuric acid to form concentrated sulphur dioxide, and a solution of ammonium sulphate for use again. The ammonia and sulphur dioxide may be absorbed in the proportion of 1.3:1.

361,378. ACIDS AND ESTERS. British Celanese, Ltd., 22 Hanover Square, London, and J. H. G. Plant, of British Celanese, Spondon, near Derby. Application date, August 20, 1930.

Acetic, propionic and other acids and esters are produced by passing a mixture of an alcohol and carbon monoxide over an acid catalyst such as phosphoric acid or acid phosphate, and the hydration of the catalyst is maintained by treating it with water, e.g., by cooling it periodically to condense water upon it, or by withdrawing it and then treating with water. The catalyst may contain promoters such as copper compounds.

361,406. DYES. A. Carpmæl, London. From I. G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, August 20, 1930.

Thioindigo dyestuffs of the anthraquinone series are obtained by oxidising anthraquinone-1:2-oxythiophene: by condensing it with cyclic diketones or their 2-derivatives, oxythionaphthalenes, and naphthoxy-thionaphthalenes and the anils of the corresponding diketodihydro-thionaphthalenes, or with 1:2-diones; or by converting in into the anils of the corresponding diketodihydro-thiophene and condensing with compounds containing reactive methylene. Examples are given.

361,443. PHTHALIC ANHYDRIDE. W. W. Groves, London. From Monsanto Chemical Works, St. Louis, Mo., U.S.A. Application date, August 27, 1930.

Naphthalene is oxidised catalytically, and the phthalic anhydride is purified by heating above its melting point with a high-boiling organic compound which is acidic or forms an acidic compound in the presence of phthalic anhydride, such as lactic, saccharic, mucic, stearic, tartaric, citric, phthalic, abietic and sebacic acids, and alcohols of high boiling point. The phthalic anhydride is then distilled or sublimed.

361,151. LITHOPONE. New Jersey Zinc Co., 160 Front Street, New York. Assignees of E. J. Flynn and G. F. A. Stutz, Palmerton, Pa., and C. B. Schertzinger, Slatington, Pa., U.S.A. International Convention date, December 21, 1929.

In the calcination of lithopone the size of the particles is increased, but if the particles of barium sulphate are initially the same size as those of the zinc sulphide they cannot be brought up to the optimum size for good covering power without over-treating the zinc sulphide. In this invention, precipitation is effected continuously under such conditions of concentration, rate of flow, and speed of stirring, that the crude lithopone obtained yields after calcination a product in which the barium sulphate particles are equal to, or larger than, the zinc sulphide particles, e.g., the barium sulphate may be 0.5—0.8 micron, and the zinc sulphide 0.2—0.5 micron. The apparatus is described.

361,253. CONCENTRATING AQUEOUS SOLUTIONS. Metallges. Akt.-Ges., 45 Bockenheimer Anlage, Frankfurt-on-Main, Germany. International Convention date, April 19, 1930.

Aqueous solutions to be concentrated are treated with calcium sulphate in the form of anhydrite, or a mixture of anhydrite and hemi-hydrate, or hemi-hydrate. The calcium sulphate is used repeatedly until converted into the dihydrate.

The calcium sulphate is obtained by treating calcium-containing materials with sulphuric acid, and this may form part of the process for obtaining phosphoric acid by treating calcium phosphates with sulphuric acid, so that the phosphoric acid is subsequently concentrated by treatment with the calcium sulphate.

361,161. CONCENTRATING NITRIC ACID. Imperial Chemical Industries, Ltd., Millbank, London. From E. I. Dupont de Nemours and Co., Wilmington, Del., U.S.A. Application date, December 22, 1930.

A mixture of weak nitric acid and sulphuric acid passes downward through a tower in counter current to weak nitric acid vapour obtained by distilling the effluent from the base of the column. The nitric acid is thereby concentrated.

361,267. AMMONIUM BICARBONATE. A. Mentzel, 2 Nordsternstrasse, Schöneberg, Berlin. International Convention date, May 14, 1930.

Ammonia liquor is treated with carbon dioxide until just before precipitation of ammonium bicarbonate commences. Ammonium sulphate solution is then added, and a mixture of ammonium sulphate and ammonium bicarbonate then precipitated for use as a fertiliser by treating the solution with further quantities of carbon dioxide and ammonia. The mother liquor is then treated with a further quantity of ammonium sulphate solution so that the process is continuous.

361,402. TIN SULPHIDE, CHLORIDE, AND OXIDE. H. E. Coley, 12a Charterhouse Square, London. Application date, August 18, 1930.

Tin ore is heated to 950°—1,000° C. and treated with a liquid sulphidising agent which may also serve as a reducing agent, e.g., a hydrocarbon containing sulphur. Tin sulphide is volatilised and may be oxidised in suspension, or may be converted into chloride and the hydroxide then precipitated and heated to obtain the oxide.

360,901. CRACKING ACID TAR OR SLUDGE. Pape and Co., Ges., Rahlstedt, Hindenburgweg, Germany. International Convention date, February 26, 1930.

Acid tar or sludge obtained from petroleum refining is heated to 700°—800° C. and the vapour passed through a tar separator and a bath of hot oil. The remaining vapour is then condensed to obtain hydrocarbons of low boiling point. The retort may be lined with a composition containing caustic soda, waterglass, magnesium sulphate, and burnt magnesia.

Specifications Accepted with Date of Application

366,944. Artificial rubber-like masses, Manufacture of. A. Carpmæl. (I. G. Farbenindustrie Akt.-Ges.). September 30, 1930.

366,970. Phosphate rock in nitric acid, Solution of. Odda Smelteverk Aktieselskap, and E. Johnson. November 7, 1929. Addition to 339,340.

366,971. Mineral salts, Treatment of. K. Haase and W. Michels. November 6, 1930.

366,973. Materials for employment in chemical reactions, as catalysts, catalyst supports, fillers, etc., Treatment of. British Celanese, Ltd., and W. Bader. November 7, 1930.

366,980. 2-aryl-1:9-isothiazoleanthrones, Manufacture of. A. Carpmæl. (I. G. Farbenindustrie Akt.-Ges.). November 11, 1930.

367,003. Isolation of alcohols of high molecular-weight. J. Y. Johnson. (I. G. Farbenindustrie Akt.-Ges.). November 5, 1930.

367,024 and 367,037. Acridine derivatives, Manufacture of. A. Carpmæl. (I. G. Farbenindustrie Akt.-Ges.). November 14, 1930.

367,102. Polyvinyl-esters and fatty oils, Manufacture of combinations of. Consortium für Elektro-Chemische Industrie Ges. December 31, 1929.

367,183. Rubber, Treatment of. Naugatuck Chemical Co. March 8, 1930.

367,282. Alcohols from alkyl sulphates, Method of recovering. Standard Oil Development Co. August 28, 1930.

367,292. Aromatic hydrocarbons and their substitution products, Manufacture of. A. Kaufmann. July 23, 1930.

367,305. Vulcanizing rubber, Method of. B. F. Goodrich Co. January 19, 1931.

Applications for Patents

[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]

- Armenault, R., Fabriques de Produits de Chimie Organique de Laire. Manufacture of urea-form-aldehyde condensation products. 5425. February 23. (France, February 23, '31.)
- Fabriques de Produits de Chimie Organique de Laire, and Malet, J. Manufacture of urea-formaldehyde condensation products. 5530. February 24. (France, February 24, '31.)
- Clark, L. M. Manufacture of sodium aluminate. 5857. February 26.
- Dering, H. O., Kelly, M. D., and Superfine Chemicals, Ltd. Production of hexamethylenetetramine. 5280. February 22.
- Distillers Co., Ltd., Dymock, J. B., Joshua, W. P., and Stanley, H. M. Manufacture of ethyl alcohol. 5521. February 24.
- Du Pont de Nemours & Co., E. I. Catalytic compositions and processes. 5709. February 26.
- Coating compositions. 5858. February 26. (United States, February 27, '31.)
- Geigy Akt.-Ges., J. R. Production of conversion products of azo-dyestuffs. 5813. February 26. (Germany, February 28, '31.)
- I. G. Farbenindustrie Akt.-Ges. Manufacture of adenosine phosphoric acid. 5263. February 22. (Germany, February 23, '31.)
- Production of naphthenates of the earth metals &c. 5702. February 25. (Germany, March 2, '31.)
- Imperial Chemical Industries, Ltd. Refrigeration. 5267, 5268. February 22.
- Gas-producing compositions. 5577. February 24.
- Welded joints. 5578. February 24.
- Dyeing process. 5710. February 26.
- Cleansing and softening agents. 5711. February 26.
- Acid pickling baths. 5855. February 26.
- Pigment compositions. 5856. February 26.
- and Spittle, H. M. Manufacture of sodium aluminate. 5857. February 26.
- Johnson, J. Y. (I. G. Farbenindustrie Akt.-Ges.). Apparatus for carrying out exothermic hydrogenation reactions. 5220. February 22.
- Apparatus for distillation of oils containing asphalt &c. 5221. February 22.
- Production of base-exchange substances. 5553. February 24.
- Manufacture of lubricating oils from fats &c. 5801. February 26.
- Fuels for Diesel engines. 5802. February 26.
- Manufacture of alpha-aminocarboxylic acids, &c. 5803. February 26.
- Reduction of phenols. 5921. February 27.
- Silica Gel Corporation. Catalytic &c. masses containing platinum. 3601. February 6. (United States, February 7, 1931.)
- Soc. of Chemical Industry in Basle. Eliminating sulphonic acid groups from anthra-quinone- β -sulphonic acids. 3225. February 3. (Switzerland, February 3, 1931.)
- Manufacture of 1-amino-2-alkoynaphthalenes. 3226. February 3. (Switzerland, February 9, 1931.)
- Manufacture of organic acid halides &c. 4115. February 11. (Switzerland, February 11, '31.)
- Standard Oil Co. Heat treatment of hydro-carbon oils. 3484. February 5. (United States, February 9, 1931.)
- Townsend, L. W. E. Production of esters. 3396. 3397. February
- Stevens, A. H. (Merl, E.). Separation of acetic anhydride from admixture with acetic acid and water. 4440. February 15.
- Wallace & Tiernan Products, Inc. Method of making di-chloramine. 5516. February 24. (United States, May 20, '31.)
- Method of making mono-chloramine. 5517. February 24. (United States, May 20, '31.)

Industrial Uses for Diatomite

THE Dominion Department of Mines, Canada, has now published in Mines Branch Report No. 723 a paper by V. L. Eardley-Wilmot dealing with the character and industrial uses of diatomite. This paper deals in detail with the structure and various types of diatomite giving analyses of material brought to the laboratories from various points in New Brunswick, Nova Scotia and Ontario. The uses of diatomite in connection with the manufacture of concrete, plasters, metal polishes and other purposes are also detailed, and data are given as to the principal world deposits of this material. A copy of the report in question can be obtained from the Director, Mines Branch, Ottawa, or from the High Commissioner for Canada, Canada House, Trafalgar Square, London, S.W.1.

Points from Manufacturers' Literature

The Editor welcomes copies of new brochures and leaflets describing plant, equipment and products of interest to chemical manufacturers and the chemical using trades.

ROTARY COMPRESSORS AND VACUUM PUMPS are described in a new leaflet issued by the B. A. Holland Engineering Co., Ltd., of 18 Victoria Street, London, S.W.1. Owing to the special feature of its unilow delivery, this company's rotary compressor is advantageously used for the purpose of compression and transportation of town gas and coke oven gas. The gas can be drawn direct from the mains and delivered into the far distant system without the necessity of any kind of equalising receivers being included in the installation. Its small overall dimensions make it possible for a plant capable of large capacity to be installed in a very confined space. For pressures from 20 in. w.g. to 10 lb. square inch, air cooled compressors are recommended, whilst for higher pressure, water cooled machines are utilised.

* * *

THE SUBJECT OF SHERARDISING is dealt with in a leaflet received from the Zinc-Alloy Rust-Proofing Co., Ltd., of Shakespeare Street, Horseley Fields, Wolverhampton. It is stated that sherardising succeeds in the protection of iron and steel against corrosion because it actually impregnates the surface with zinc, giving an alloy which is exceptionally resistant to normal atmospheric corrosion. Traces of acid solutions in polluted atmospheres attack zinc-protected iron-work in time, but to overcome this additional protection is secured by dipping the sherardised work in a special grease solution. This grease film adheres tenaciously to the matt grey sherardised surface and successfully resists the effect of any chemical action on the zinc.

* * *

A NEW THREE STAGE COAL BREAKER is described in a leaflet which is being sent out by Hadfields, Ltd., of Sheffield. This breaker, known as the "Hecla," has several revolutionary features and its capabilities are a revelation to all who have used it, or seen it working. The capacity of the breaker is enormous and the total reduction of the material crushed is claimed to be greater than that of any other breaker on the market. The coal is subjected to three successive crushing operations, and whilst capable of taking a large feed size the machine will produce a product as fine as $\frac{3}{4}$ -inch cubes and under. The machine can be adjusted, of course, to give a coarser product if desired, accompanied by an increase in the output. Both the rolls and the lower breaker plate shoe are made of Hadfield's patent "Era" manganese steel. The use of this material, by reason of its great hardness and extraordinary toughness, ensures that these parts of the breaker will have the maximum of durability and maintain their efficiency for a long period of time.

Origin of Vitamin C

Researches in Scandinavia

THREE Scandinavian workers, Ottar Rygh, Aagot Rygh, and Per Laland, have obtained what appears to be conclusive evidence that narcotine, one of the less toxic alkaloids which is present in opium, is one of the precursors of the antiscorbutic vitamin C. In the first issue of the *Zeitschrift für physiologische Chemie*, 1932, these authors describe how they found the alkaloid in various unripe fruits and vegetables, but failed to detect its presence in the ripened materials. From 200 unripe oranges they prepared 600 mgm. of the alkaloid; and by extracting the concentrate, consisting of oil and crystals, from 15,000 oranges at various stages of ripeness, they were able to trace the gradual increase in antiscorbutic power as ripening proceeded. Pure, commercial narcotine was not antiscorbutic, but irradiation from a quartz mercury vapour lamp activated it to some extent without appreciably altering its physical properties. Narcotine was found in unripe tomatoes (20 mgm. in 20 kgm.), white cabbage (40 mgm. in 100 kgm.), and in potatoes (12 mgm. in 20 kgm.); qualitative indications of the presence of narcotine were found in milk, but none in red bilberries. Of various derivatives of narcotine, the orthodihydroxy derivative—methylnarcotine—was found to be particularly antiscorbutic.

Weekly Prices of British Chemical Products

The following notes on the chemical market conditions in Great Britain are based on direct information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greiff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market are specially supplied by Chas. Tennant and Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

CHEMICAL prices in London are very firm, with a tendency to advance in view of the import duties which are now in force. There is a good steady call for most articles and prices should be regarded as more or less approximate until it is seen what effect the import duties have upon them. Prices of coal tar products remain firm and unaltered. On the Manchester market, the tendency of virtually every description of chemical product during the past week has been firm, and widespread interest as to the effect of the tariff on prices of imported materials has been aroused. The call for contract deliveries of the heavy descriptions, in particular, has been maintained at a fair level, although there has been only a moderate weight about the new orders that have been placed. The past week or so has witnessed a slight improvement in the amount of business placed in cotton textiles, and from this point of view, therefore, the outlook for chemicals regarding the consumption by the dyeing and finishing trades when the new work reaches that stage is so much the brighter. There have been no material changes in the market conditions in Scotland, where prices remain steady.

General Heavy Chemicals

ACETATE OF LIME.—MANCHESTER: Brown, £8 per ton; grey, £12 to £12 10s.
ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.
ACID, ACETIC.—Tech. 40%, £19 15s. per ton d/d address U.K. in casks. LONDON: Tech. 80%, £37 5s. to £39 5s.; pure 80%, £38 5s. to £40 5s.; tech. 40%, £19 15s. SCOTLAND: Glacial 98/100%, £48 to £50; pure 80%, £38 5s.; technical 80%, £37 5s. d/d buyers' premises Great Britain. MANCHESTER: 80% commercial, £39; tech. glacial, £52.
ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in one-ton lots upwards.
ACID, CHROMIC.—11d. per lb., less 2½% d/d U.K.
ACID, CITRIC.—LONDON: 1s. 1d. to 1s. 2d. per lb., less 5%. *1s. 1d. per lb. MANCHESTER: 1s. 2½d.
ACID, FORMIC.—LONDON: £51 to £52 per ton.
ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.
ACID, NITRIC.—80° Tw. spot, £20 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.
ACID, OXALIC.—LONDON: £50 per ton in casks, £51 10s. in kegs. CHROMAND: 98/100%, £50 to £53 ex store. MANCHESTER: £2 10s. per cwt., ex store.
ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations: 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.
ACID, TARTARIC.—LONDON: 1s. 2½d. per lb., less 5%. SCOTLAND: B.P. crystals, 1s. 1½d. to 1s. 1½d. less 5% carriage paid. MANCHESTER: 1s. 2d.
ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.
ALUMINA SULPHATE.—LONDON: £8 15s. to £9 10s. per ton according to quality and quantity. *£8 10s. SCOTLAND: £8 to £8 10s. ex store.
AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10s. to 1s. containers extra and returnable.
AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb. d/d, according to quantity.
AMMONIUM CARBONATE.—SCOTLAND: Lump, £36 per ton; powdered, £38, packed in 5-cwt. casks d/d U.K. stations or f.o.b. U.K. ports.
AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. (See also Sal ammoniac.)
AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton, carriage paid according to quantity. (See also Sal ammoniac.)
AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.
ANTIMONY OXIDE.—SCOTLAND: Spot £29 per ton, c.i.f. U.K. ports.
ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 4d. to 1s. 6d. per lb. according to quality.
ARSENIC.—LONDON: £24 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £26 10s. f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £28 10s. ex store. MAN-

CHESTER: White powdered Cornish, £25 10s. to £26 at mines.
ARSENIC SULPHIDE.—Yellow 1s. 6d. to 1s. 8d. per lb.
BARYTES.—£7 10s. to £9 per ton according to quality.
BARIUM CHLORIDE.—LONDON: £11 10s. per ton. SCOTLAND: £11 5s. in casks, ex store.
DISULPHIDE OF LIME.—£7 10s. per ton f.o.r. London, packages free.
BLEACHING POWDER.—Spot 35/37% £7 10s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5s. 6d. cwt. casks.
BORAX, COMMERCIAL.—Granulated £15 10s. per ton, powder £17, packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.
CADMIUM SULPHIDE.—3s. 6d. to 3s. 9d. per lb.
CALCIUM CHLORIDE.—Solid 70/75% spot £5 5s. to £5 15s. per ton d/d station in drums. SCOTLAND: £5 5s. to £5 15s., according to quantity and point of delivery.
CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.
CARBON BLACK.—4d. to 5d. per lb. ex wharf.
CARBON TETRACHLORIDE.—£45 to £55 per ton, drums extra.
CHROMIUM OXIDE.—10d. to 10½d. per lb. according to quantity d/d U.K. Green 1s. 2d. per lb.
CHROMETAN.—Crystals 3½d. per lb. Liquor £19 10s. per ton d/d U.K.
COPPERAS GREEN.—SCOTLAND: £3 15s. per ton, f.o.r., or ex works.
CREAM OF TARTAR.—LONDON: £5 7s. 6d. per cwt.
DIPHENYLGUANIDINE.—2s. 6d. per lb.
FORMALDEHYDE.—LONDON: 28s. 6d. to 30s. 6d. per cwt. SCOTLAND: 40%, £28 per ton ex store.
HYDROGEN PEROXIDE.—LONDON: *100 vols. 10d. per lb.
INDIARUBBER SUBSTITUTES.—White, 4d. to 5½d. per lb.; Dark, 4d. to 4½d.
LAMPBLACK.—£46 to £50 per ton.
LEAD ACETATE.—LONDON: White £42 to £44 per ton. Brown £1 per ton less. *£43 and £42 respectively ex wharf London. SCOTLAND: White Crystals £42 to £44 c.i.f. U.K. ports. Brown £1 per ton less. MANCHESTER: White, £39 to £40; Brown, £38.
LEAD NITRATE.—MANCHESTER: £20 per ton.
LEAD, RED.—SCOTLAND: £30 per ton d/d buyer's works.
LEAD, WHITE.—SCOTLAND: £40 per ton carriage paid.
LITHOPONE.—30%, £20 to £22 per ton. LONDON: £20 to £22.
MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.
METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. id. extra in all cases. Prices according to quantities. SCOTLAND: Industrial quality 64 O.P., 1s. 8d. to 2s. 3d.
NICKEL AMMONIA SULPHATE.—£38 per ton d/d.
NICKEL SULPHATE.—£38 per ton d/d.
PIPERIDINE RUBBER ACCELERATORS.—P.P.D., 10s. 6d. to 11s. 6d.; Z.P.D., 7s. to 7s. 6d.; L.P.D., 6s. 6d. to 7s.; P.T.D., 9s. 8d. to 10s. 4d.; C.P.D., 8s. 3d. to 8s. 10d. S.P.D., 8s. 1d. to 8s. 7d. Superac Standard 7s. Superac Z 3s. 6d.
POTASH CAUSTIC.—£30 to £33 per ton. MANCHESTER: £38.
POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quality. Ground, 5½d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports with allowance for contracts. MANCHESTER: 5d.
POTASSIUM CARBONATE.—SCOTLAND: 96/98% spot £28 per ton ex store. MANCHESTER: £30 to £31.
POTASSIUM CHLORATE.—3½d. per lb. export London in 1-cwt. kegs. LONDON: £33 to £35 per ton. SCOTLAND: 99½/100% powder £34. MANCHESTER: £35.
POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.
POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £28 per ton c.i.f. U.K. ports. Spot £30 per ton ex store.
POTASSIUM PERMANGANATE.—LONDON: 8d. to 8½d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8d.; B.P., 8½d.
POTASSIUM PRUSSIAN.—LONDON: 8½d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.
SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d address in barrels.
SODA ASH.—58% spot, £6 per ton f.o.r. in bags, special terms for contracts.
SODA, CAUSTIC.—Solid 76/77° spot £14 10s. per ton d/d station. SCOTLAND: Powdered 98/99% £17 10s. in drums, £18 15s. in casks. Solid 76/77% £14 10s. in drums. 70/72% £14 12s. 6d. carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £12 15s. to £14 contracts.

* Prices quoted by other manufacturers.

SODA CRYSTALS.—Spot £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—97/98%, £21 per ton; LONDON: £22.

SODIUM BICARBONATE.—Refined spot £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous 5d. per lb. LONDON: 4d. per lb. with usual discounts for contracts. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—2¼d. per lb. LONDON: £30 per ton. MANCHESTER: £30.

SODIUM CHROMATE.—3½d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals £15 ex station 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15 to £15 10s.

SODIUM NITRITE.—Spot £19 to £22 per ton d/d station in drums.

SODIUM PERBORATE.—LONDON: *10d. per lb.

SODIUM PHOSPHATE.—£13 to £15 per ton f.o.r. London casks free. LONDON: Dibasic, £13 per ton. MANCHESTER: £13 to £14.

SODIUM PRUSSIAN.—LONDON: 5d. to 5½d. per ton. SCOTLAND: 5d. to 5½d. ex store. MANCHESTER: 5½d. to 6½d.

SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground Spot £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.

SODIUM SULPHIDE.—Solid 60/62% Spot £10 15s. per ton d/d in drums. Crystals Spot £7 15s. per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11 10s.; commercial, £8 5s.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot £9 10s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £18 10s. per ton f.o.b.

SULPHUR.—£12 5s. to £15 15s. per ton. SCOTLAND: Flowers, £12 10s.; roll, £12 10s.; rock, £9. Ground American, £12 ex store.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 6s. 8d. to 6s. 10d. per lb.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £12 per ton.

ZINC SULPHIDE.—1s. to 1s. 2d. per lb.

Pharmaceutical and Photographic Chemicals

The following changes are reported in the markets for pharmaceutical and photographic chemicals:—

AMMONIUM IODIDE.—19s. 6d. to 20s. per lb.

ARSENIC IODIDE.—22s. 6d. to 25s. per lb.

CADMIUM IODIDE.—17s. 6d. to 18s. per lb.

CALCIUM IODIDE.—20s. per lb.

IRON IODIDE.—17s. 6d. to 18s. per lb.

LITHIUM IODIDE.—20s. 6d. to 21s. 6d. per lb.

LEAD IODIDE.—14s. to 15s. per lb.

STRONTIUM IODIDE.—17s. 6d. per lb.

ZINC IODIDE.—21s. to 22s. per lb.

MERCURIC IODIDE, RED.—16s. 9d. to 17s. per lb.

MERCURIC IODIDE, GREEN.—14s. 11d. to 15s. 2d. per lb.

MERCURIC IODIDE, YELLOW.—16s. 5d. to 16s. 8d. per lb.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—5½d. to 6½d. per lb. Crude, 60's 1s. 4d. to 1s. 5d. per gal.

ACID, CRESYLIC.—99/100, 1s. 8d. to 1s. 9d. per gal.; B.P., 2s. 6d. to 3s.; Refined, 2s. to 2s. 2d.; Pale, 98%, 1s. 7d. to 1s. 8d.; Dark, 1s. 4d. to 1s. 4½d. LONDON: 98/99%, 1s. 6d. Dark 95/97%, 1s. 4d.

BENZOL.—At works crude 7d. to 7½d. per gal. Standard motor, 1s. 2d. to 1s. 3d.; 90%, 1s. 3d. to 1s. 4d. Pure, 1s. 6d. to 1s. 7d. LONDON: Motor, 1s. 5½d.

CREOSOTE.—Standard for export, 4½d. to 5d. nett per gal. f.o.b. for Home, 3½d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 3½d. to 4½d.

NAPHTHA.—Solvent, 90/160, 1s. 3d. per gal.; 95/160, 1s. 5d. to 1s. 6d. 90/190, 11d. to 1s. 2d. LONDON: Solvent, 1s. 1½d. to 1s. 2d.; heavy, 11d. to 1s. 0½d. f.o.r.

NAPHTHALENE.—Purified crystals, £11 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6.

PITCH.—Medium Soft, £4 10s. to £4 15s. per ton in bulk at makers' works. LONDON: £4 to £4 5s. f.o.b. East Coast port. MANCHESTER: £4 to £4 5s. f.o.b.

PYRIDINE.—90/140, 4s. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. to 2s. 6d.

TOLUOL.—90%, 2s. 4d. per gal.; Pure, 2s. 6d.

XYLOL.—2s. per gal.; Pure, 2s. 3d.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:—

ACID, BENZOIC, B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID, NAPHTHIONIC.—1s. 2d. per lb. 100% d/d buyer's works.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.

ACID, SULPHANILIC.—Spot, 8½d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra, d/d buyer's works.

BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.

o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.

m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.

p-CRESOL.—34.5° C.—1s. 9d. per lb., in ton lots.

DICHLORANILINE.—2s. 2d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., packages extra, d/d buyer's works.

DINITROBENZENE.—8½d. per lb.

DINITROTOLUENE.—48/50° C., 8d. per lb.; 66/68° C., 8½d. per lb.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

a-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

B-NAPHTHOL.—Spot, £75 per ton in 1 ton lots, d/d buyer's works.

a-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

B-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 10d. per lb.

m-NITRANILINE.—Spot, 2s. 6d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 6½d. per lb.; 5-cwt. lots, drums extra, d/d buyer's works.

NITRONAPHTHALENE.—8½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb. 100% d/d buyer's works.

o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—Spot, 1s. 9d. per lb., d/d buyer's works.

m-XYLIDINE ACETATE.—3s. 6d. per lb., 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £7 10s. per ton. Grey, £12 per ton. Liquor, 8d. to 9d. per gal.

ACETIC ACID, TECHNICAL, 40%.—£16 15s. to £17 15s. per ton.

ACETONE.—£63 to £65 per ton.

AMYL ACETATE, TECHNICAL.—90s. to 98s. per cwt.

CHARCOAL.—£6 10s. to £10 10s. per ton, according to grade and locality.

IRON LIQUOR.—24°/30° Tw., 10d. to 1s. 2d. per gal.

METHYL ACETONE.—40/50%.—£52 per ton.

RED LIQUOR.—16° Tw., 8½d. to 10d. per gal.

WOOD CREOSOTE.—1s. to 2s. 6d. per gal., unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.

WOOD TAR.—£2 10s. to £6 per ton.

BROWN SUGAR OF LEAD.—£32 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Export.—The market has continued unchanged at £5 5s. per ton f.o.b. U.K. port in single bags. There has been the usual seasonal increased demand in most consuming markets, but as supplies appear to be plentiful prices have not risen.

Home.—On account of the long spell of fine weather, farmers are purchasing for immediate delivery. The present volume of business is greatly in excess of that for the last three years, and it is expected that the increase in consumption will be large.

IMPORTED NITRATE OF SODA.—Movements from Liverpool to Ireland have been reported. No doubt the fine weather will stimulate the demand. The price has increased to £9 per ton delivered, for 6-ton lots to consumer's nearest station.

BRITISH NITRATE OF SODA.—Price is on the same level as imported material.

NITRO-CHALK.—The demand is beginning to set in, especially in the south. Reports indicate that sales will be bigger than last year.

* Prices quoted by other manufacturers.

Latest Oil Prices

LONDON, March 2.—LINSEED OIL was steady. Spot, ex mill, £18 10s.; March, £15 17s. 6d.; March-April, £16; May-August, £17; September-December, £18, naked. RAPE OIL was quiet. Crude extracted, £31; technical, refined, £33, naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £23; refined common edible, £27 10s.; deodorised, £29 10s., naked, ex mill. TURPENTINE was quiet. American, spot, 56s.; March-April, 56s. 6d. per cwt.

HULL.—LINSEED OIL, spot, £15 5s. per ton; March, £15 10s.; April, £15 17s. 6d.; May-August, £16 15s.; and September-December, £17 15s. per ton, naked. COTTON OIL, Egyptian crude, spot, £23; edible, refined, spot, £25; technical, spot, £25; deodorised, £27 per ton, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £26 per ton, naked. GROUNDNUT OIL.—Crushed-extracted, spot, £36 10s.; deodorised, £40 10s. per ton. RAPE OIL.—Crushed-extracted, spot, £30; refined, £32 per ton. SOYA OIL.—Crushed-extracted, spot, £24; deodorised, £27 10s. per ton. COD OIL, 16s. 6d. per cwt. CASTOR OIL.—Pharmacy, spot, 48s. 6d.; first, 43s. 6d.; second, 41s. 6d. per cwt. TURPENTINE.—American, spot, 58s. 9d. per cwt.

Scottish Coal Tar Products

BUSINESS has revived to some extent and consumers are now considering their forward position. Refined coal tar is active with supplies on the short side, but the finer products remain somewhat unstable.

CRESYLIC ACID.—Pale, 99/100 per cent., 1s. 3½d. to 1s. 4½d. per gal.; pale, 97/99 per cent., 1s. 1½d. to 1s. 2½d.; dark, 97/99 per cent., 1s. 0½d. to 1s. 1½d.; all f.o.r. makers' works. High boiling acid is scarce with value at 2s. 9d. to 3s. per gal.

CARBOLIC SIXTIES.—Production is limited and value is steady at 1s. 7d. to 1s. 8d. per gal. f.o.r. in bulk quantities.

CREOSOTE OIL.—Specification oils, 3d. to 3½d. per gal.; washed oil, 3½d. to 4d.; gasworks ordinary, 3½d. to 4d.; all f.o.r. makers' works in bulk.

COAL TAR PITCH.—Business is being turned down for want of supplies. Value for export is nominal at 75s. to 80s. per ton f.o.b. Glasgow, while the home market now commands 80s. to 82s. 6d. per ton ex works in bulk.

BLAST FURNACE PITCH.—Controlled prices have been raised to 60s. per ton f.o.r. works, and 65s. per ton f.a.s. Glasgow for export.

REFINED COAL TAR.—Many orders have been placed during the week at 4d. to 4½d. per gal. at makers' works in buyers' packages.

WATER WHITE PRODUCTS.—Motor benzol, 1s. 3½d. to 1s. 4½d. gal.; 90/160 solvent, 1s. 2½d. to 1s. 3½d.; and 90/190 heavy solvent, 1s. 0½d. to 1s. 1½d., all in bulk ex works.

South Wales By-Products

THERE is very little change to report in South Wales by-product activities. The demand for pitch is small and confined to prompt parcels. Refined tars have a fairly steady, if moderate, demand with quotations unchanged for coke oven and gasworks tar. Road tar has a fair call with values unchanged round about 13s. per 40-gal. barrel delivered. Naphthas continue to have an exceptionally slow market, there being scarcely any call for heavy, while the solvent demand is sporadic and moderate. Motor benzol remains a fairly bright feature, but creosote is weak. Patent fuel and coke exports remain unsatisfactory. Patent fuel prices are:—19s. to 19s. 3d., ex-ship, Cardiff; 18s. to 18s. 3d., ex-ship, Swansea. Coke prices are:—Best foundry, 32s. 6d. to 36s. 6d.; good foundry, 22s. 6d. to 25s.; furnace, 17s. to 18s.

Parent Coal Carbonisation Trust Ltd.

IN the Company's Court, Chancery Division, on Monday, February 29, Mr. Justice Bennett had before him a petition for the compulsory winding-up of Parent Coal Carbonisation Trust, Ltd.

Mr. A. Grant, K.C., appeared for the company, and said a scheme had been prepared, which it was hoped would go through. He asked for the petition to stand over till the first petition day in next sittings. There was no opposition to this.

His lordship: Who represents the opposing creditors?

Mr. Grant: I do.

His lordship ordered the petition to stand over till the first petition day in next sittings.

Cuprene Manufactured in Switzerland

CUPRENE (carbene) is being produced by a Swiss firm, the output consumed chiefly in the manufacture of explosives. Among other purposes it is used as a filler for linoleum; in the manufacture of acid resisting and insulating plastics; as a substitute for corkpowder, woodmeal and peatmeal; and as an absorbing agent by fuel and lighting gases. A small quantity of cuprene tar is produced as a by-product.

International Dye Agreement

I.C.I. and the Continental Group

IT is announced that the London negotiations of the Continental dye group, embracing Germany, France and Switzerland, with the Imperial Chemical Industries have been successfully concluded. There are no price regulations, and the agreement does not cover business in North America.

Officials of Imperial Chemical Industries are reticent about the successful conclusion of negotiations. Confirmation has been given, however, to the statement made in the original message from Berlin. It is understood that the agreement goes a little further than might be implied from the foregoing, in that it extends to all world markets except the North American market. The German dye manufacturers, who had a long start in certain overseas markets are known to have revealed for years past a certain reluctance to come to an agreement with this country. Our departure from the gold standard, coupled with Germany's internal financial and industrial difficulties, appear now to have paved the way for the present agreement which is the result of talks that have gone on for months. The agreement is presumed to allocate various markets to various countries, but no information has been forthcoming as to the markets that in future will be reserved for the I.C.I. group.

European Saltcake Association Dinner

Presentation to Mr. Kendrick

THE retirement of Mr. John Kendrick from the joint management of the European Saltcake Association was celebrated by a dinner given in his honour by the Association in London, on Thursday, February 25. The event is of particular interest to the chemical industry as the Saltcake Association comprises practically all the producers of saltcake in England, Germany, France and Belgium. Representatives of all members of the association attended to pay tribute to Mr. Kendrick, who is 77 years of age and has been connected with the industry in the Liverpool district for more than 60 years, having been for many years general sales manager of The United Alkali Co., Ltd. Owing to doctor's orders it was unfortunate that Sir Max Muspratt was unable to be present.

The toast of the guest was given by the Chairman of the Association, Mr. F. W. Bain, vice-chairman of I.C.I. (General Chemicals), Ltd., who presented Mr. Kendrick with a super-radio gramophone and solid silver salver, suitably inscribed, on behalf of the Association. Representatives of the continental groups and others added their tribute to Mr. Kendrick, led by Dr. G. C. Clayton, M.P., who was present as a guest. He was followed by Mr. E. Weber Andrae, a director of I. G. Farbenindustrie, who voiced the feelings of the German group; by Mr. C. Brouwers, a director of L'Union Chimique Belge, on behalf of the Belgian group; by Mr. J. Couvreur, secretary of the French group, and finally by Mr. S. A. Sadler, of Sadler and Co., Ltd., who spoke on behalf of the original members of the Association and in a characteristic speech asked Mr. Kendrick to accept from them a grandmother clock and case of pipes as a mark of their esteem.

Proceedings of Bituminous Coal Conference

ANNOUNCEMENT is made of the publication of the Proceedings of the Third International Conference on Bituminous Coal, which was held under the auspices of the Carnegie Institute of Technology, Pittsburgh, U.S.A., in November, 1931. The proceedings, printed in two volumes of approximately 900 pages each, include all papers and discussions delivered at the four-day meeting. Contributions of scientists from Belgium, France, Germany, Holland, Italy, Japan, Roumania, Spain, Sweden and Russia have been translated into English, and illustrations and graphs have been incorporated in the books. Among the subjects discussed by outstanding experts during the conference and included in the two volumes are: Economics of the bituminous coal industry, competition between fuels, low temperature and high temperature carbonisation, coal carbonisation problems, gasification, by-products, hydrogenation and liquefaction, railway and steamship fuel, domestic utilisation of coal, power plant fuel, pulverised fuel, smoke and dust abatement, preparation of coal, coal cleaning, origin and classification and stream pollution. These proceedings are similar to the two sets previously issued, and will be regarded throughout the world as standard reference works on fuel technology.

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This advertisement will appear every alternate month.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgment

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

JNO. DENSLEY, 24 Connor Street, Victoria Park, chemical importer. (C.C., 5/3/32.) £45 6s. 3d. November 24.

London Gazette, &c. Company Winding Up

ALLIED CEMENT MANUFACTURERS, LTD. (C.W.U., 5/3/32.) Sir G. Garnsey, K.B.E., 3 Fredericks Place, Old Jewry, London, E.C.2, appointed liquidator, February 19.

Chemical Trade Inquiries

These inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country) except where otherwise stated.

BRITISH WEST INDIES.—A merchant firm in Kingston desires to undertake representation for the Island of Jamaica of United Kingdom manufacturers of disinfectants. (Ref. No. 391.)

MALAY.—A firm of merchants incorporated in Belgium and previously handling Belgian and French products requires sole representation for Malay of manufacturers of paints and disinfectants in medium and cheap qualities. (Ref. No. 403.)

BELGIUM.—A representative at Brussels wishes to obtain representation of United Kingdom exporters of paper making materials, china clay, wood pulp, waste paper, colouring, resin, etc. (Ref. No. 411.)

ROUMANIA.—The Roumanian State Railway Administration is calling for tenders to be presented in Roumania by April 2, for the supply of 3,400 tons of creosote. (Ref. F.X. 1421.)

WEST INDIES AND CENTRAL AMERICA.—A manufacturers' representative shortly leaving on a tour of the West Indies and Central America, desires to obtain additional agencies for paints, varnishes, edible fats and oils, matches, etc. (Ref. No. 438.)

PANAMA.—A commission agent in Panama desires to obtain agencies for Panama and the Canal Zone for paints, varnishes, oils, etc. (Ref. No. 439.)

Tariff Changes

TUNIS.—A decree dated January 15, provides that the export of phosphates of lime from Tunis is, temporarily, to be subject to licence.

New Companies Registered

CELLOMOLD, LTD., 204/6 Great Portland Street, London, W.1. Registered March 1. Nominal capital £6,000 in £1 shares. Manufacturers, importers and exporters of and dealers in plastic materials, varnishes, lacquers and all other materials consisting of or in which are incorporated cellulose acetate, cellulose nitrate, cellulose ethers, natural or synthetic resins, shellac, rubber, gutta-percha, balata bitumen, bone asphaltum, asbestos, wood-meal, slate, silica, etc.

EDWARD WIGGINS AND CO., LTD., Essex House, High Street, Stratford, London, E.15. Registered February 20. Nominal capital £10,000 in £1 shares. To acquire the business of manufacturing chemists carried on by Edward Wiggins and Co., Ltd., and to carry on the business of manufacturers, importers and exporters of and dealers in lubricating oils, greases, bitumens, asphaltums, petrol and disinfectants. Directors: E. A. Wiggins, H. H. Holmes, A. J. Cole.

LEONARD LEE AND CO., LTD., 12 Camomile Street, London, E.C.2. Registered February 18. Nominal capital £3,000 in £1 shares (2,000 preference and 1,000 ordinary). To acquire the business of manufacturers of, agents for and dealers in disinfectants and other chemical products carried on by L. A. Lee, Doris Lee and V. Lee, as "Leonard Lee and Co." at Gander Green Lane, Sutton, Surrey, and 12 Camomile Street, E.C., and to carry on the business of manufacturers of and dealers in disinfectants and other chemical products, nitrates, iodines, linseed, cotton and other cakes, etc. Directors: L. A. Lee, Doris Lee, V. Lee.

POLYSULPHIN CO. (1932), LTD., Keynsham, near Bristol. Registered February 19. Nominal capital £19,000 in £1 shares. To acquire the business of chemical and soap manufacturers, engineers, and machinery makers, and general merchants, as formerly carried on by Polysulphin Co., Ltd., at Keynsham, near Bristol and elsewhere. Directors: I. P. C. Abraham, D. I. L. Beath, Betty Z. G. Peters, Amy M. L. Wills.

TECHNICAL AND RESEARCH PROCESSES, LTD. Registered February 29. Nominal capital £100 in £1 shares. Consultants, consulting engineers, advisers, experimenters, analysts, assayers, chemists, etc. Directors: H. J. Round, Westfield, Colney Hatch Lane, Muswell Hill, N.; and G. R. Bishop.

Company News

STAVELEY COAL AND IRON CO.—An interim dividend of 6d. per share (2½ per cent.), tax free, has been declared, payable on March 31.

UNITED GLASS BOTTLE MANUFACTURERS, LTD.—A final ordinary dividend of 5 per cent., less tax, is recommended, making 7½ per cent. for the year 1931, which is the same as was paid in the previous year.

BOOTS PURE DRUG CO., LTD.—An interim dividend at the rate of 24 per cent. per annum, less tax, on the ordinary shares for the quarter, payable March 31, is announced. This is at the same rate as in the previous quarter.

DRUG INCORPORATED.—The full report, now available, shows that earnings in the year 1931 were \$19,440,457, equal to \$5.55 per share, against \$21,130,698, equal to \$6.03 per share, in 1930. Adverse exchange, it is stated, affected earnings to the extent of \$500,000.

UNITED TURKEY RED CO.—The directors announce, subject to audit, profits for 1931 of £2,758, after providing fully for all trading charges, including maintenance and depreciation. Dividends on the £582,370 four per cent. and £341,250 five and a half per cent. preference shares, which have been paid, are charged against reserves. No dividend is recommended on the 682,500 Ordinary shares of £1.

JOHN OAKLEY AND SONS, LTD.—The report for the year 1931 shows net profits, including £7,100 brought forward, £38,699. After payment of interim dividend on the ordinary shares, there remains £26,440. The directors recommend a final dividend of 7½ per cent., less tax, on the ordinary, making 10 per cent. for the year, and 10 per cent. on the employees' shares, leaving £7,432 to be carried forward.

CEREBOS, LTD.—After making provision for depreciation of investments, amounting to £43,849, the net profit for the year to November 30, 1931, amounted to £204,538, as compared with £226,218 in the previous year. It is proposed to maintain the dividend at 30 per cent., tax free, to place £50,000, at last year, to reserve, and to carry forward £123,074, compared with £118,536 brought in. The balance-sheet shows a slight decline in stocks at £58,304. Investments, however, are up from £257,385 to £413,908. Cash appears at £107,050, against £293,663.

JOSEPH NATHAN AND CO., LTD.—The accounts for the year to September 30, 1931, show a net profit of £52,311. No dividend is recommended on the ordinary shares, against 10 per cent. in the previous year. The surplus, however, is up from £32,702 to £50,013. It is stated that the directors' policy has been to keep as liquid a financial position as possible. The balance-sheet shows that amounts due to bankers are reduced by £28,500 and stocks by £42,000, while sundry debtors are less by £40,000. During the year certain new overseas subsidiary companies took over local trading assets, thus increasing the amount invested in and due from subsidiary companies, and reducing other assets by £32,500.

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